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Agriculture.

THE LOCATION OF WATER BY MEANS OF THE DIVINING ROD AND AUTOMATIC WATER FINDER.

BY G. B. BROOKS, Instructor in Agriculture.

One of the most important problems the settler commencing operations has to solve is the securing of an ample supply of water for farm use.

In several districts the absence of permanent water and the uncertainty of finding an underground supply has been a serious drawback to agricultural progress.

In localities where the subsoil is of a retentive nature, this difficulty can be met by the storing of water in dams or tanks. Unfortunately, in many of our scrub areas the soil is so deep and porous that conserving water by this means is invariably a failure, and the settler has, therefore, to resort to the obtaining of a supply from either a well or bore.

The selection of a site for such is of very great importance, for, if a supply cannot be obtained at a reasonable depth, the cost of both sinking and subsequent lifting of the water becomes a very expensive item. It is well known that large sums of money have been spent and much time lost by operating on unfavourable situations.

The location of underground supplies at a comparatively shallow depth is by no means a simple matter in many districts. A method by

which such could be determined with certainty would be of inestimable value both to the settler and to the State at large.

It is claimed by many that there is such a method which has been in existence for generations—viz., the mysterious divining rod.

Much controversy has raged as to the efficacy of this method. Scientists have given the subject much consideration, but, as far as I am aware, the results obtained from investigations made are somewhat conflicting.

It is also claimed that a large amount of success has resulted from the use of a mechanical device known as the "automatic water finder"; two of these instruments are in possession of the Lands Department.

To me, the subject of water supply for the farm is of absorbing interest, for I find in my work amongst the settlers in recently settled scrub areas that a tremendous handicap is placed upon the agricultural progress of the district by its absence—in fact, the first information invariably asked for is in connection with the obtaining of such.

On admitting my belief that certain individuals have the power to locate underground supplies by means of divining, and, moreover, having this gift myself, my services are usually requisitioned in the selection of a site for sinking operations.

Although the location of water is what may be termed a side-line in connection with my work, entailing a little extra time and labour, yet the benefit accruing is ample compensation should the settler succeed in securing a supply at a reasonable depth.

In the hope of solving the mystery of the divining rod—or, at least, in obtaining some fresh information regarding it—it was thought that an excellent opportunity presented itself to carry out some tests in this direction. One of the instruments belonging to the Lands Department was, therefore, obtained on loan; and when on a recent visit to Mount Larcom and the districts adjacent to the Dawson Valley Railway line, both methods were put into operation, the one being used as a check on the other.

Although this occurred only a comparatively short time ago, several reports have already come to hand, stating that water had been secured at shallow depths on the site indicated. So far I have not yet heard of any failures.

Those who are sceptical in regard to the use of the divining rod (in my opinion the actual rod has very little to do with it) may say that

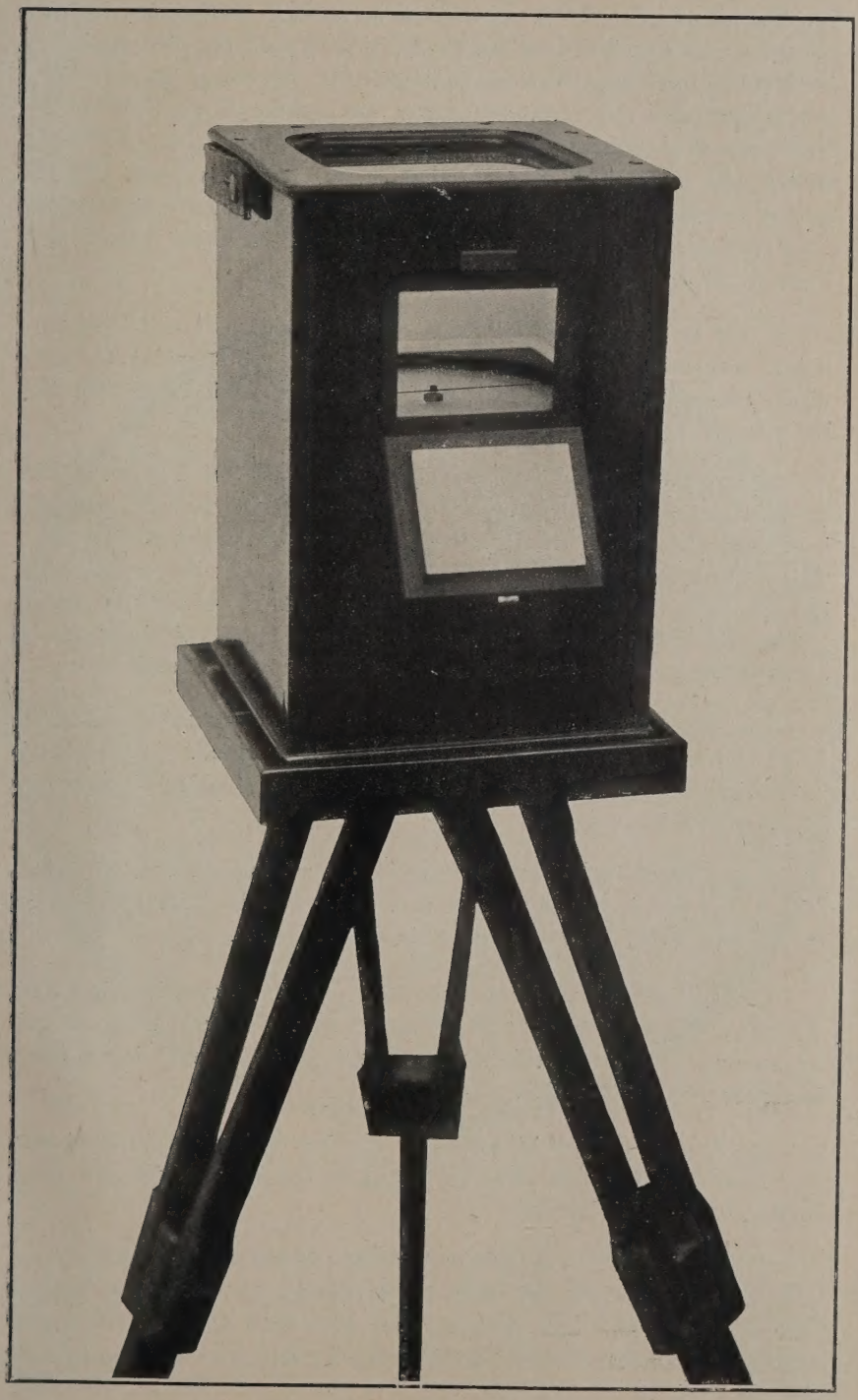


PLATE 54.—THE AUTOMATIC WATER FINDER.

the finding of water is no proof that the stream was located by this means, as in all probability a supply could have been obtained anywhere in the same locality at a corresponding depth. This may be quite true, but, apart from the finding of water, the results obtained from the tests were, if not startling, at least of very great interest, and, I think, go to prove that the divining rod is not altogether a piece of tom-foolery as many imagine, for I quickly discovered that a very intimate relationship existed between the movements of the instrument and those of the diviner.

It may be mentioned that in the location of a site the method of procedure was to first prospect the ground with the rod, marking the spot where indications were secured, and afterwards checking it with the instrument.

The remarkable part of the proceeding was that I was able in most instances, by using the rod, to inform those present how the instrument would behave even before it was taken out of the case. This, I think, goes to show that there must be an electrical or magnetic influence in existence between the individual and a current of water moving through and near the surface of the earth. This influence is probably only exercised over those endowed with special sensitiveness.

The automatic finder may be described as an electrical or magnetic device enclosed in a small case supported on a tripod. The internal mechanism is surmounted by a dial with delicately adjusted magnetic needle some 6 in. long

It is claimed that if the instrument, after being carefully adjusted with a compass, is placed in close proximity to an underground stream of water the needle will be deflected in that direction.

Observations on readings were taken on the respective sites and duly recorded. A few of these are shown herewith, from which it will be seen that the deflection or movement of the needle is in some instances very considerable.

In each of the illustrations shown, the test with the instrument was first made on either side, and then finally on the centre of the stream as located by the divining rod.

It was invariably found that when placed on the middle of a stream running north and south the needle would eventually come to rest at zero, but when running east and west the behaviour was altogether different, a wide deflection with a continuous movement being the result.

The subject of locating water is undoubtedly of considerable importance and one that offers a large field for investigation. There are probably many secondary influences which affect both the diviner and the working of the instrument. For instance, I have observed that it is difficult to get satisfactory results with the rod during a thunderstorm. An electric disturbance would, in all probability, also cause a variation in the instrument.

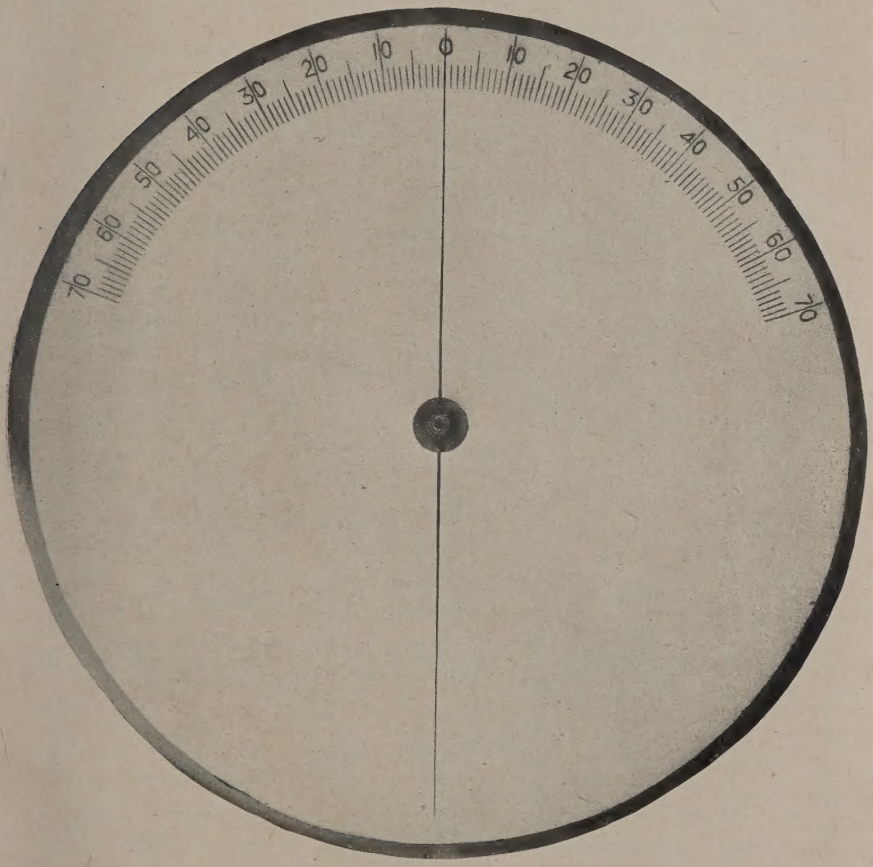


PLATE 55.—DIAL OF AUTOMATIC WATER FINDER, SHOWING MAGNETIC NEEDLE AT ZERO.

Other factors to be considered are—Moisture in atmosphere, proximity to growing timber, heavy clay subsoil, ironstone or other minerals, condition of sky (cloudy, &c.), the time tests are carried out (morning, noon, &c.), physical condition of diviner (sensitiveness, effect of excitement, &c.)

REFERENCE NOTES TO DIAGRAMS.

..... Dotted line shows where prospecting has been done with divining rod.
× Where indications of water were found.
——— Direction of stream.
1 – 3 Numerals show where tests were made with automatic water finder.
30 20 10 0 10 20 30
Readings given by indicator on dial of instrument.

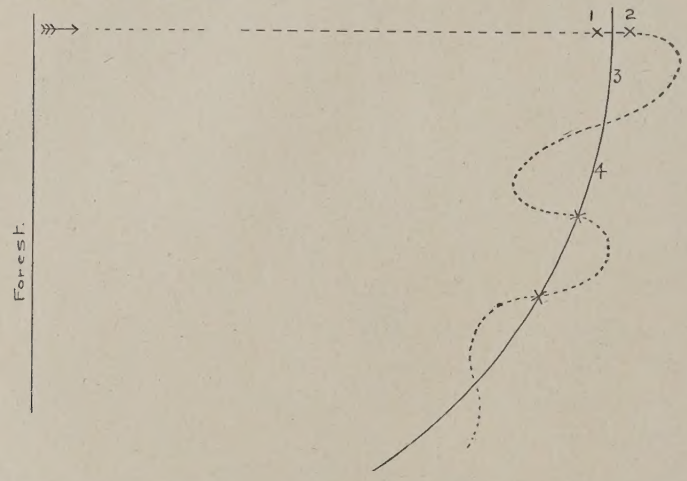
OBSERVATION NOTES—SITE No. 1.

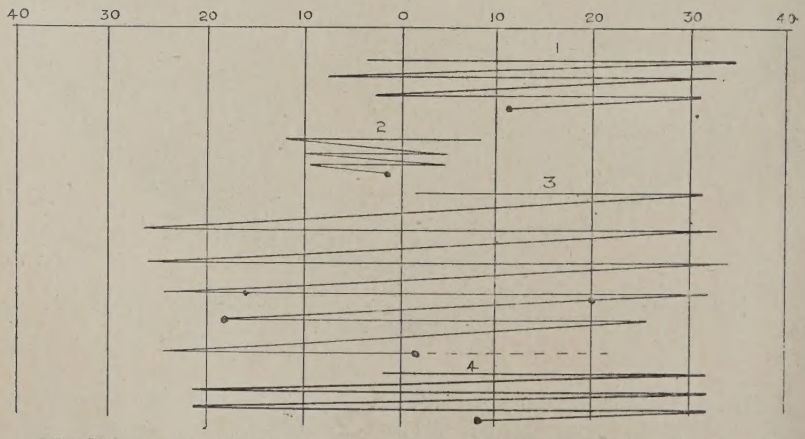
Date, 30-3-14. Time, noon.

Weather, fine; wind, S.E.; scattered clouds.

Standing forest, about 200 yards N. of site.

Land: Cleared forest and scrub. Was informed that the site selected was right on the divide.



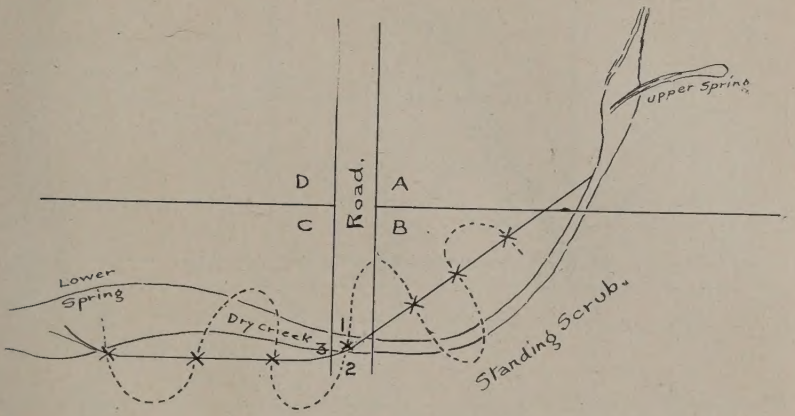


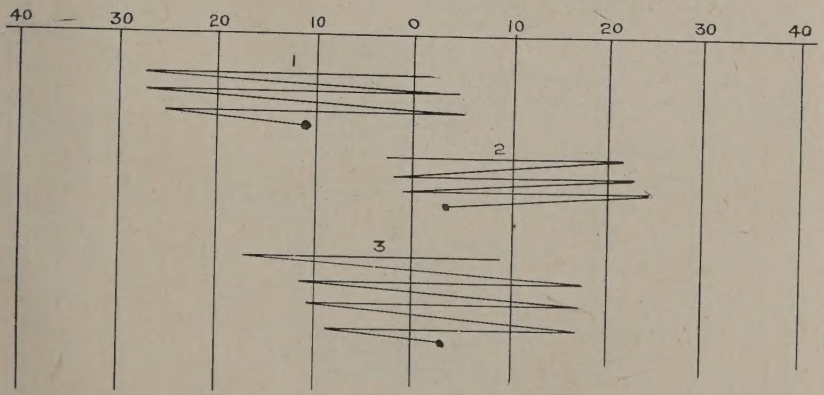
Needle movement slow and steady when instrument was placed on either side of stream indicated by the divining rod, but when placed on actual spot the effect was remarkable, a very wide deflection with quick continuous movement being the result.

OBSERVATION NOTES—SITE No. 9.

Date, 31-3-14. Time, 2.30 p.m.

The object in this instance was to locate an underground stream of water flowing between two springs. A strong flow from an upper spring disappears in the limestone formation, apparently coming to the surface again in the bed of the creek some 300 yards distant, on a different selection.





The selector in B put down several wells in the bed of this creek in the hope of tapping the stream, but with negative results.

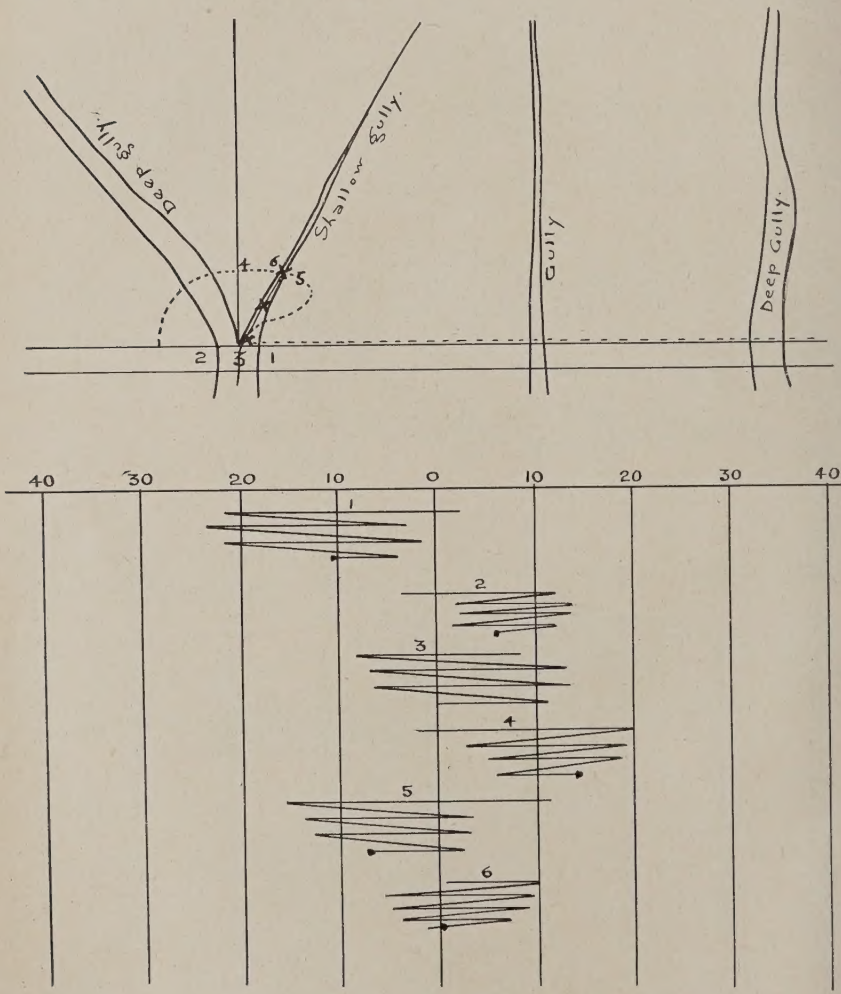
Both divining rod and instrument indicated that the flow followed a course quite different to that of the gully.

OBSERVATION NOTES—SITE No. 3.

Date, 30-3-14. Time, 4 p.m.

Weather, fine; wind, S E.; scattered clouds.

Land: Cleared scrub. Standing scrub opposite side of road.



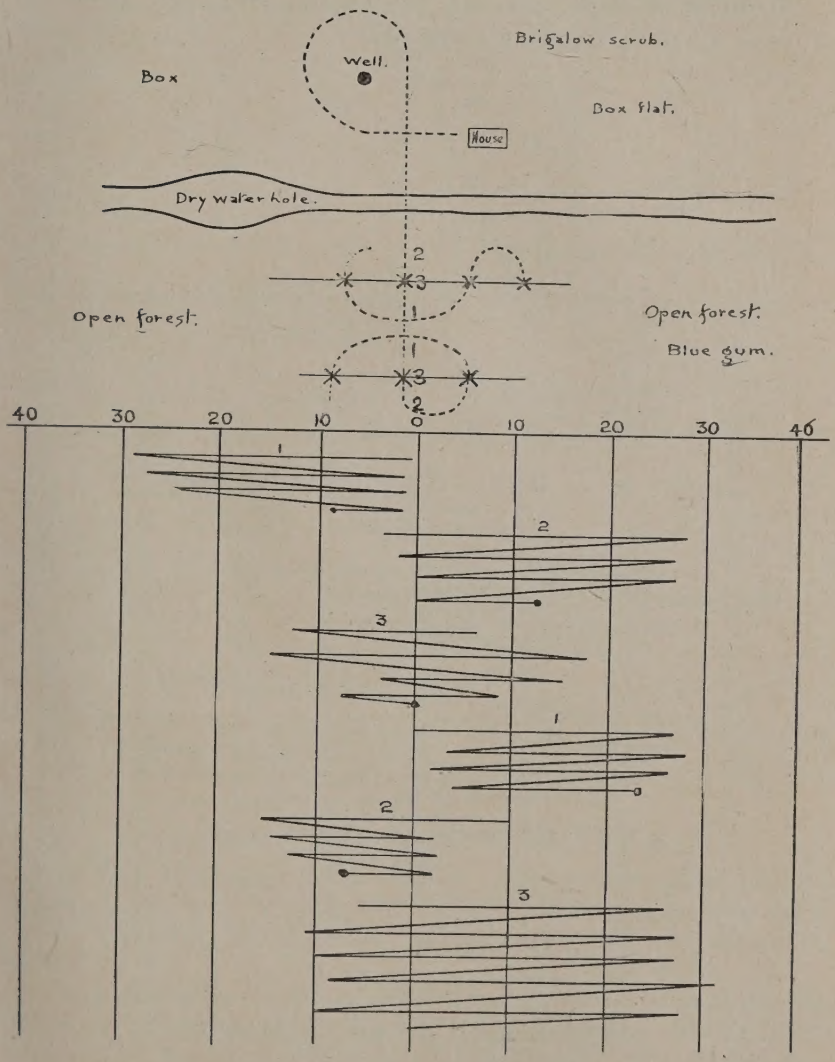
Indications of water obtained right on boundary line; needle movement very steady.

OBSERVATION NOTES—SITE No. 16.

Date, 4-5-14. Time, 5 p.m.

Weather, fine; wind, S.E.; open sky.

Land: Open forest. Box and brigalow country some 300 yards distant. Well put down on box flat over 80 ft. deep; no water.



Secured indications of two streams. Needle movement on first quivering and jerky; on second, when instrument placed immediately adjacent to stream movement, steady; but when right on stream, quick and continuous.

OBSERVATION NOTES—SITE No. 2.

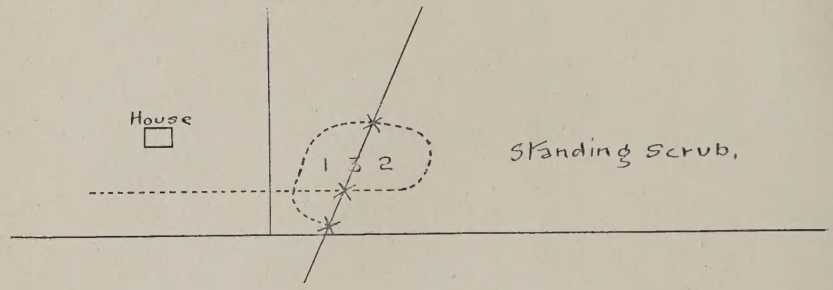
Date, 30-3-14. Time, 1.30 p.m.

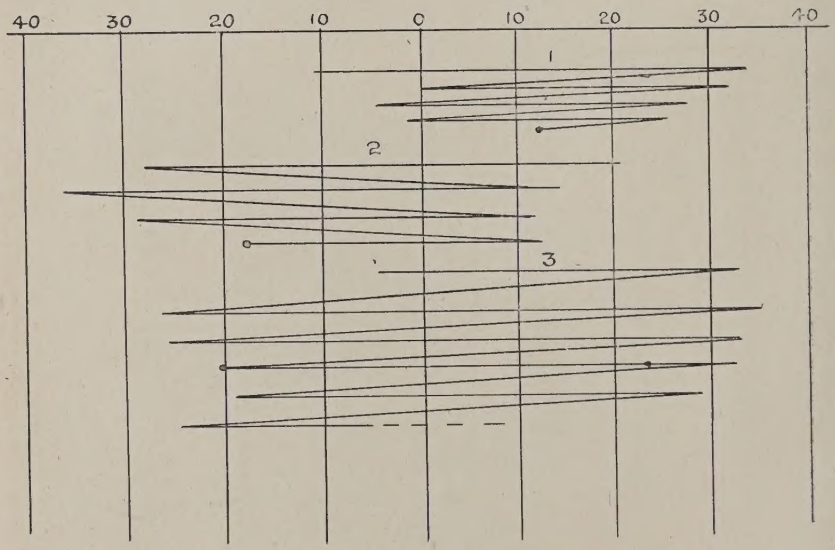
Weather, fine, very hot; few scattered clouds; no wind.

Land: Cleared scrub. Heavy crop of Rhodes grass. Standing scrub 50 yards distant.

Limestone abundant in locality Probability of ironstone.

Movement of needle, quivering and erratic; practically continuous movement on site selected by divining rod.





OBSERVATION NOTES—SITE No. 5.

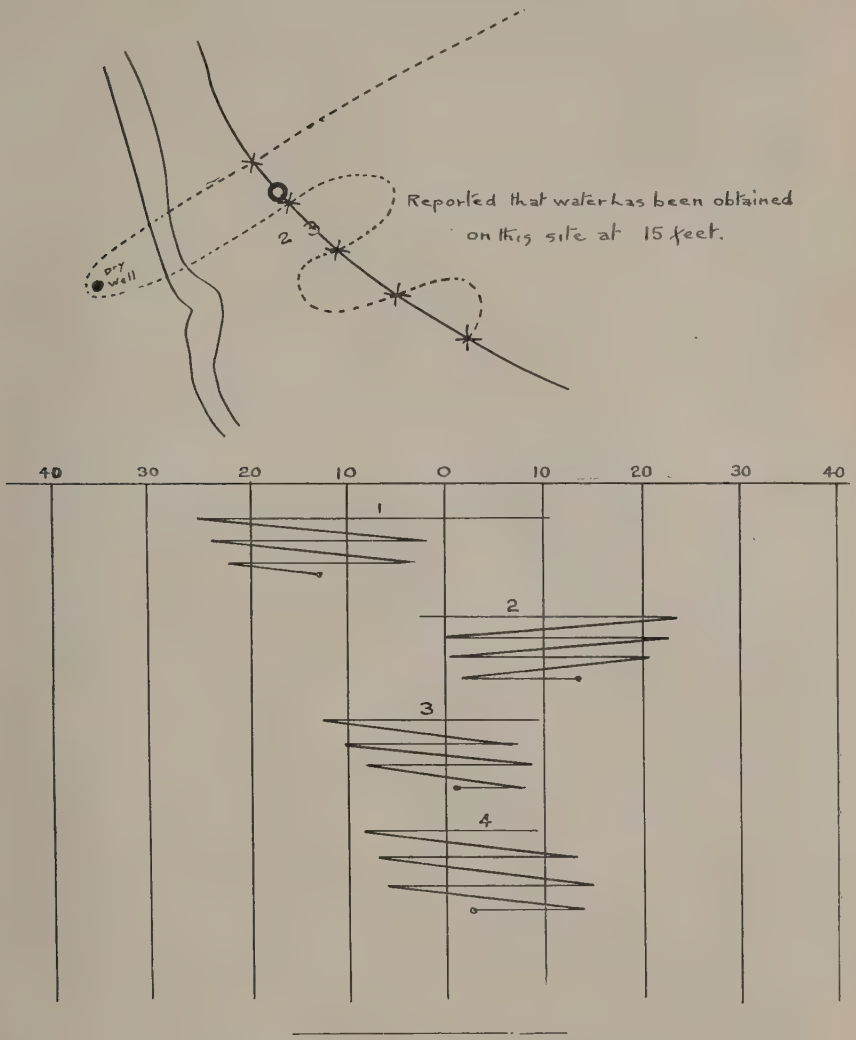
Date, 27-3-14. Time, 2 p.m.

Weather, fine; very hot; few scattered clouds; no wind.

Land: Cleared scrub. Standing scrub about 100 yards W. side.

Two wells put down previously on same flat with negative results.

Movement of needle, steady



CORN-GROWING COMPETITION, 1914-15.

1. This competition will be open to all under the age of eighteen years who are residents of the State of Queensland. An entrance fee of 2s. 6d. must be forwarded to the Under Secretary with the application to enter.

2. Applications to be enrolled in the competition containing the following particulars must reach the Under Secretary, Department of Agriculture and Stock, Brisbane, not later than 12 noon on 21st September, 1914:—

(*a*) Full name and address.
(*b*) Age at last birthday and date of birth.
(*c*) Occupation
(*d*) District in which applicant resides.

3. The area to be devoted to the planting of the seed maize shall be one-tenth of an acre, selected seed for which will be supplied free of cost; but one parcel only will be supplied to each competitor during the period of the competition.

4. Each competitor shall have absolute freedom in his choice of ground, and in the methods he may adopt in preparing, planting, and cultivating his plot, but in no case shall a plot exceed one-tenth of an acre, otherwise disqualification will be incurred.

The following table shows the length the rows must be to give the exact area according as 4, 5, 6 or more rows are planted:—

Number of Rows 4 feet apart.	Length of Rows in Feet.	Number of Rows 4 feet apart.	Length of Rows in Feet.
4	272 feet 3 inches ..	8	136 feet 1½ inch
5	217 feet 10 inches ..	12	90 feet 9 inches
6	181 feet 6 inches ..	16	68 feet
7	155 feet 7 inches ..		

5. Each competitor will be required to keep a record chart showing the dates and particulars of the different stages of work, and these charts are to be delivered, at the time of harvesting, to the officer appointed for superintending and verifying the yield. Duplicate forms for recording all work done and observations made on the plot will be supplied to each competitor.

6. Within seven days from the verification of the yield from the crop, each competitor shall select, without aid from other persons, ten cobs of the maize from his crop and forward them to the Principal of the Queensland Agricultural College, Gatton. Labels for this purpose will be supplied.

7. Competitors must notify the Under Secretary of the date when the crop shall have matured and be ready for inspection.

8. No competitor shall be allowed to employ or permit any labour upon the competition plot standing in his name, other than his own personal labour, excepting in relation to the driving of horses, for which, owing to circumstances, such help may be needed.

9. The competition will close on the 30th June, 1915, and the prizes will be allotted thus: The competitors will be grouped according to the following districts:—

(1) LOGAN.—From the coast to Six-Mile Creek, by railway line, then in south-west direction to Mount Lindsay, border of New South Wales.

(2) WEST MORETON.—From the Logan boundary on the east to the Main Range, north to Yarraman, south-west to border of New South Wales.

(3) DARLING DOWNS NORTH.—To and including Greenmount, Pittsworth, Jondaryan, Goombungee, Crow's Nest, Spring Bluff, Oakey, Drayton.

(4) DARLING DOWNS SOUTH.—Including Nobby to Wallangarra, Texas, Goondiwindi, Killarney, Freestone, Leyburn, Condamine, Yandina, Darkey's Flat, Clifton, Allora, Millmerran.

(5) MARANOA.—From and including Dalby to Charleville, Mitchell, Morven, Cunnamulla, Mungindi, St George, Surat.

(6) MORETON.—From and including Nundah, North Pine, Nudgee, Caboolture, Woodford, Kilcoy, Sandgate, Samford, Samson Vale, Humpybong, Maroochy, Eumundi; northern boundary to include parishes of Kenilworth, Maleny, and Conondale, thence south by Mary River.

(7) WIDE BAY AND BURNETT.—From the coast and including Biggenden, Kilkivan, Nanango, Gayndah, Tewantin, Degilbo, Pialba, Howard, Maryborough, Gympie, Bundaberg, Childers, Gin Gin, Isis, Mount Perry, Eidsvold. Northern boundary, 24½ degrees of latitude, Dawson River on west.

(8) CENTRAL QUEENSLAND.—From 24½ degrees of latitude to and including St. Lawrence, Gladstone, Rockhampton, Mount Morgan, Emerald, Jericho, Springsure, Clermont, Aramac, Longreach.

(9) NORTH QUEENSLAND.—North of St. Lawrence to and including Mackay, Bowen, Townsville, Cairns, Cooktown, Atherton, Charters Towers, Ravenswood, Winton, &c.

If there are more than ten competitors in any district three prizes will be awarded for competition in that district; less than ten competitors, one prize only.

The prizes shall be of the following value:—First, £5; second, £2; third, £1.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize

The prizes awarded in any district may be increased in number and value by donations from persons, firms, or societies who may be interested in the competition.

10. Three special prizes of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

These prizes may be increased in number and value in the same way as is indicated above in connection with the district competitions.

11. The aggregate points will be 100 and the judging will be based upon the following:—

(*a*) Quality of the maize produced.

(*b*) Yield of plot.

(*c*) Notes and records of plot.

12. Arrangements will be made for such of the competitors as may so desire to travel by rail to the Agricultural College during the week when the judging is decided, when instruction in corn-growing and judging will be afforded.

13. The Principal of the Queensland Agricultural College will be the sole judge of the competition, and his decision shall be final.

JOHN WHITE, Secretary for Agriculture and Stock.

Brisbane, 15th August, 1914.

POTATO GROWING : HINTS TO FARMERS.

By F. W. ULBRICH, Agricultural Inspector (Tas.)

During the month of May all seed potatoes for early and late crops should be placed in whatever receptacle has been set aside for the "Greening Process."

Any dry, well-lighted, clean shed where the wind has access to the tubers will do.

No tubers for seed should be placed on the bare ground.

All flooring should be open, so as to admit of free currents of air.

Tubers should be spread in thin layers, not more than two deep.

Select only the best-shaped and truest to type of any variety.

Any tubers showing signs of disease should be removed and "*destroyed by boiling or burning.*"

For the past two seasons some growers have been using a very handy, cheap, and almost ready-made and easily-removable "shed" for the purpose of greening seed. I allude to any three or four railed fence adjacent to a row of pine trees, which, I am pleased to say, are ready to hand on a number of farms in this State. The method followed is:—Run another fence parallel to the one already in existence; place rails or any handy timber from rail to rail, beginning with the bottom one. Cover these rails with tubers, and then proceed to do the same on the second rails, and so on till each panel of fencing carries its quota. A rough roofing may be easily provided by using either galvanised iron sheets or bark, so as to keep any excessive rain from reaching the tubers before they are greened; when once greened, neither rain or frost will do any harm. Tubers so treated will not have any long shoots, but only short, strong, stout ones, which are not easily knocked off.

The use of formalin as a steep for tubers is confidently recommended. It is immaterial whether tubers be dipped cut or whole.

Tubers must be allowed to dry after being steeped before planting. The steep recommended is 1 lb. bottle of formalin to 32 gallons of water.

Tubers or sets should be steeped for two hours, but should a grower forget to remove any from the dip at the end of two hours he need not be alarmed, as the writer has had "*no misses*" from sets (cut) that had an all-night bath. This experience has been verified by more than one grower.

No grower should plant potatoes this year in any paddock where a "grubby" crop was the result of last season's work. Give the old paddock a good liming *at once*, if not already done, and plough to 6 in. at least, taking care to carefully turn the sod.

Where the green manuring is to be tried this coming season, growers would be well advised to pack the green crop well when ploughing under.

In order that plenty of soil may be available for covering the tubers of next season, growers are again urged to set every fourth furrow of 8 in., so as to give 32 in. between the rows.

The advantages of this have been stressed by the writer times out of number, and they are, briefly, more soil for covering purposes. The hills will not be so abrupt, and consequently the soil does not fall back into the drill, but remains where it is needed.

The greater width gives more room for that clean cultivation which is necessary to keep prevailing pests in check.—"Agricultural Gazette of Tasmania."

BROOM MILLET.

Growers along the Hunter, the Richmond, the Manning, and sister rivers, are surprised when told of the relatively large prices realised in Sydney, Melbourne, Hobart, Launceston, and New Zealand ports—during a lean season in New South Wales—for supplies of broom millet from Italy and the United States. Growers here of this line have yet fully to learn a similar lesson to that taught to Cumberland growers of lemons and oranges by Italian growers. This lesson related to care in gathering, in grading, to tissue wrapping, and to packing in suitable boxes. So with the broom millet. The Italian and American shippers are exceedingly careful as to what the trade terms the get-up of the bales. Thereby the Sydney price of foreign prime long hurl is enhanced, it being graded and carefully packed; also, there is never, in these arrivals, the slightest attempt to add false weight, as, unfortunately, used to be a practice with a small section of New South Wales senders, who made weight by a sly addition of stones, earth, &c. This practice has ceased since its exposure by Christchurch and Dunedin consignees.

The omission now is in care in get-up for the Sydney market. It would be the height of folly for New South Wales river growers of broom millet to despise taking a lesson from foreign senders. Timely attention to marketing puts money in the farmer's pocket. Not only so, but a Hunter River or other grower quickly gains a reputation for care and reliability in the get-up; and, when his name is established, his produce sells offhand on reputation, whereas the bales that arrive from a grower who is "sometimes careless" cannot be sold at sight, and often suffer in price through having to wait till the buyers make a thorough inspection.

Further, it has for years been a common mistake with many river consignors to think that a little of the second grade, or a little of the discoloured and inferior, intermixed with the long hurl packages will do no harm in the cash receipts. On the contrary, the detection of a few handfuls of second and lower grades will excite the buyers' suspicion, and may materially lower the gross value of a bale that is "nearly all choice hurl." The buyers, in the hurry-scurry of business, have no time to spend in an ultra-inspection, in order to find out if inferior stalks are purposely mixed (even in minute quantities) with prime. The Northern River sender who wishes to get the top price of the day in Sussex street—£35 a ton—needs to be "minutely honest" in grading.—"Town and Country."

PROFITABLE FARMING.

The excellent returns which are recorded from time to time resulting from planting and sowing tubers and cereal seeds which have been carefully bred—and which, after much experiment, have been placed on the market, often at very high prices—go to prove that by such breeding far higher average crops have been obtained than by sowing the same kind of seed year after year because it is cheap.

"Garden and Field" records that an English farmer has raised a crop of wheat which realised £1,666 7s. 3d., without the value of the straw, from the produce of 8 bushels, which he purchased two years ago at 1 guinea a bushel. The wheat is a new variety brought out by the Cambridge University School of Agriculture, and he purchased the seed for £8 8s. The first year he had a crop of 349 bushels. Planting the whole of this, he had a total crop of 6,160 bushels, which he sold for the price stated.

NATIONAL SHOW, 1914—COURT OF THE DEPARTMENT OF AGRICULTURE AND STOCK.

The Court occupied by the Department of Agriculture and Stock this year at the National Show covers approximately 6,000 sq. ft. of floor space and 3,000 sq. ft. of wall space.

Taken as a whole, the exhibits are so arranged as to bring before the public a number of individual sections, representing a part of the Department's activities, these being classed in such a way as to afford as much information as possible, at the same time being of a highly educational character.

In a general way the trophies are grouped under four main headings:—Tropical, Temperate, Pastoral, and Agricultural. The several divisions are made up by—

Tropical Products from Kamerunga.

Exhibit of Sugar-cane from Mackay Sugar Experiment Station.

Wool Trophy.

Entomology and Plant Pathology (four trophies), as follows:—

- Diseases of Fruit and Vegetables.
- Queensland Butterflies, Moths, and Beetles.
- Life Histories of Insects Injurious to Fruit and Vegetables.
- Insectivorous Insects of the Moreton District.

Botanical Exhibit, embracing the Chief Natural Grasses of Queensland and 54 framed Specimens of Weeds and Suspected Poisonous Plants.

Wheat and Wheat-milling Exhibits—the former being drawn from the chief growing districts of the State, the State Farms at Hermitage and Roma, and the Departmental Experiment Plots; the latter from the Agricultural Chemist's Model Flour Mill and Laboratory.

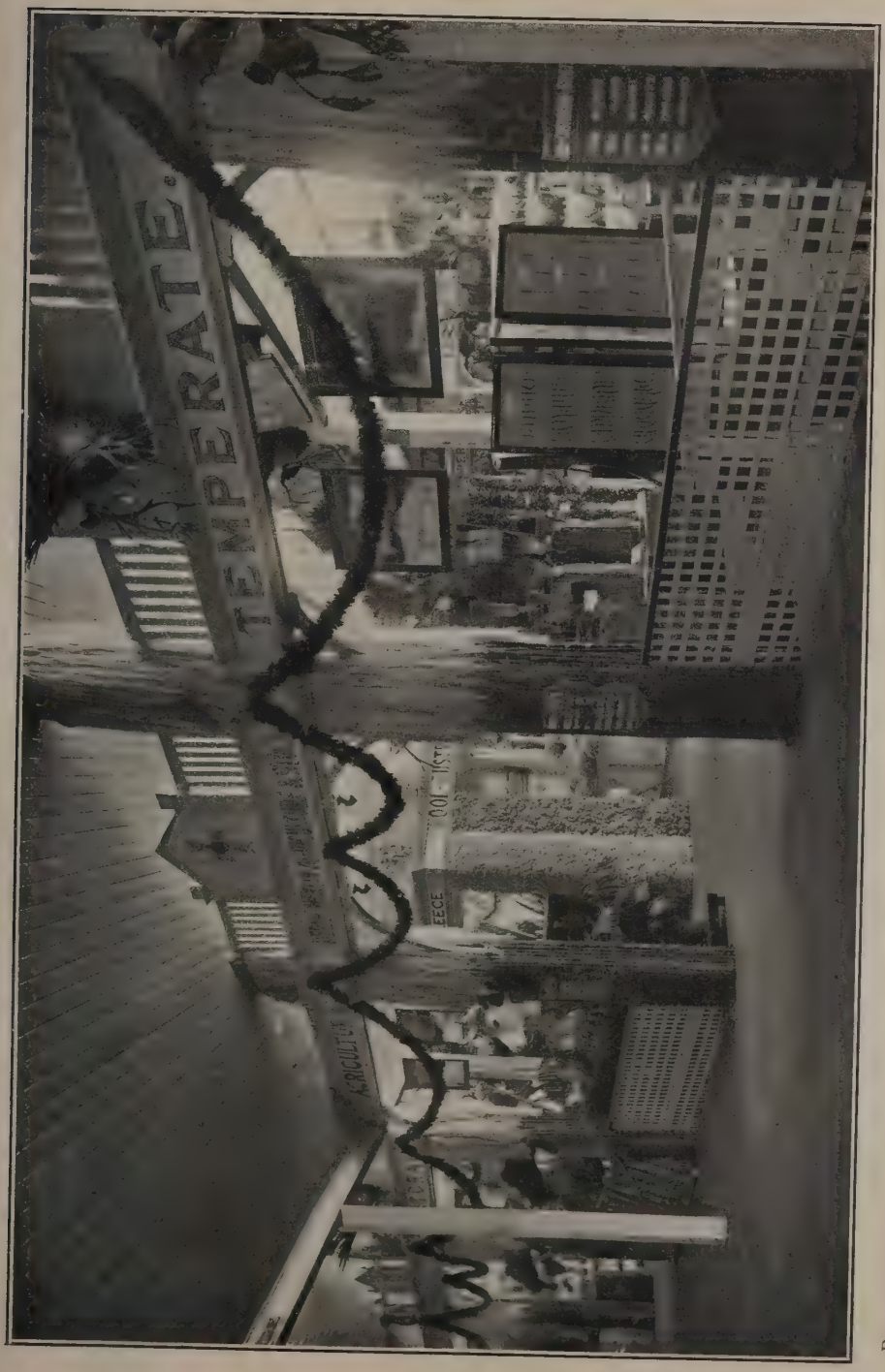


PLATE 56.—FRONT OF DEPARTMENTAL COURT (AGRICULTURE AND STOCK), NATIONAL AGRICULTURAL ASSOCIATION SHOW, BRISBANE, 1914.

Dry Farming Exhibit, illustrating the work carried out at the Roma State Farm, which includes Wheat and Cowpea Breeding Experiments.

Maize Exhibit from the Departmental Seed Grain Propagation Plots.

Bacteriological Exhibit from the Stock Experiment Station, Yeerongpilly.

Division of Dairying (Statistical).

Fruit Exhibit.

Broom Millet Trophy.

Tobacco.

Exhibit of Harness and Blacksmithing Work from the Agricultural College, Gatton.

Taking each exhibit *seriatim*, fuller descriptions are as follows:—

KAMERUNGA STATE NURSERY.

Whilst the majority of purely tropical fruits and other products of the soil will thrive in many parts of Central and Southern Queensland, it is to the Tropical North that we must turn our attention to find them in their fullest development. Of the many tropical fruits raised, new varieties of mangoes may be mentioned, such as the Badaga and Malda Seedling, and the high quality Carabao mango from the Philippines. An entirely new Cherimoya (Custard Apple), *Anona cherimolia*, far superior to that class of fruit usually seen in the Southern markets, has been introduced experimentally.

The Mangosteen, which has several times been imported from Java, both as seed and plant, had never been a success until in 1891 and 1892. Eventually four trees survived at the Nursery, and so slow was the growth that it was only in 1913 that one of the trees flowered and bore fruit, which tree was the first and only one of 600 seeds to mature its fruit in Queensland.

It is entirely due to the work of the Nursery that rubber trees of different varieties have been planted in small areas in the North. Several thousands of trees have almost reached the tapping stage, whilst at Kamerunga the Pará rubber trees have been several times tapped. Specimens of the growing trees, tapping instruments, and of the finished article may be seen at the Exhibition, as well as of other products, such as vanilla, which thrives well in the North and produces heavy crops of this valuable bean, which takes two or three years to come into crop, and can readily be made to pay, and pay well, in tropical Queensland.

Visitors and Southern settlers know practically nothing about the economic value of such products as are here to be seen, such as various fibres, kola nuts, coconuts, coca from which the cocaine of commerce is produced, ginger, spices of various kinds, pepper and other condiments—all going to show that they can be produced as well in North Queensland as in the West Indies, Dutch East Indies, Brazil, or any other purely tropical country. Coffee is also not wanting. Sweet potatoes and yams

PLATE 57.—KAMERUNGA STATE NURSERY EXHIBIT, DEPARTMENTAL COURT, N.A. SHOW, BRISBANE, 1914.

can be grown well in the North, and there are five or six varieties grown at the Nursery—the Large White Potato and New Guinea Panna Potato, the White Chinese, &c.—all good table yams. Cardamoms are also grown to some extent, as well as the now well-known Gros Michel Banana and the rarer Breadfruit, so intimately associated with the wonderful boat voyage of Captain Bligh.

Besides all these, there are shown oils and gums of various kinds, drugs and fibres, mountain rice, &c.

SUGAR-CANE.

The Exhibit of Canes sent in by the Director of the Sugar Experiment Station, Mackay—many originally imported from New Guinea, others raised from seed at Hambledon, Cairns, and by the Acclimatisation Society—give evidence of what may be achieved by careful selection and scientific cultivation. Each variety shown is accurately described as to nomenclature, habit of growth, suitability for different localities and different soils, its propensity or otherwise for arrowing, &c.

In fact, all the information required by the cane-grower to enable him to select any variety is clearly and concisely given. It is doubtless largely owing to the distribution of new and valuable canes, such as many of those here seen, that a record crop of 242,000 tons of sugar was obtained last season in Queensland, and, judging by the reports of various cane inspectors, it would appear as if this year's crop will not fall far short, if at all, of the same tonnage.

WOOL EXHIBIT.

The greater part of the activities of this branch of the Department's work cannot well be shown in a concrete form. The Exhibit, however, shows clearly the fruits of good sheep-husbandry, and consists of fleeces drawn from many of the best flocks in Queensland.

Besides these high-quality wools, fleeces from small holdings are shown, which are little inferior to the best. These are instructional, inasmuch as they indicate that no man having good sheep need despair of producing wool of equal quality.

The panels of the Wool Pagoda are designed to show the geological features of the different parts of Queensland, as far as wool-production is concerned. Mulga wools, blacksoil wools, "desert" wools, are shown on these; the bright scoured wools being merely decorative.

A number of photographs of sheep, possessed by the Department, are also shown by way of illustration.

Some of the stages of cloth manufacture may be seen on the walls of the Wool kiosk, the whole Exhibit, in short, having been designed for instructional rather than for spectacular purposes.

ENTOMOLOGY AND PLANT PATHOLOGY.

Another division of the Department's activities is illustrated by three trophies in which are displayed—(1) A series of life histories of selected destructive insects; (2) Certain typical examples in the classes

PLATE 58.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), SHOWING WOOL, FRUIT, SUGAR-CANE, AND MILLET EXHIBITS, NATIONAL AGRICULTURAL SHOW, BRISBANE, 1914.

PLATE 59.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), ENTOMOLOGICAL AND VEGETABLE PATHOLOGICAL EXHIBIT, NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

Butterflies, Moths, and Beetles (systematically arranged); and (3) The diseases of Fruits and Vegetables. It comprises cases devoted to the following objects:—(*a*) Insect Enemies of Citraceous Plants; (*b*) Insect Enemies of Citraceous Plants, Scale Insects only; (*c*) Branch-cutting Borer of Orange; (*d*) Prodenia Cut Worm; (*e*) Army Worm; (*f*) Potato Lady Bird Beetle; (*g*) Potato Flea Beetle; (*h*) Potato Mining Caterpillar; (*i*) Sweet Potato Weevil; (*j*) Sweet Potato Web Worm; (*k*) Cabbage Diamond Moth, Cabbage Godara Moth, Cabbage Hellula Moth; (*l*) Pumpkin Beetle; (*m*) Bean Fly and Fruit Fly; (*n*) Grain Moth and Maize Moth; (*o*) Flour Moth.

The second exhibit referred to includes only the commoner insects of the classes mentioned, also a case containing stick and leaf insects, and are such as the entomologist commonly encounters.

The third embraces a case illustrating the notorious Potato Blight and its parasite, and, in addition, numerous examples of disease-affected plants that admit of being displayed in glasses, in fluid—all having descriptive labels attached.

The same division of the Department is also responsible for a very fine exhibit of the Insectivorous Birds of the Moreton District, each bird having one (or more, where plumage variation is a feature) case devoted to it, there being about 150 cases in all.

DIVISION OF BOTANY.

There are some 200 kinds of grasses representative of all parts of the State exhibited in this section by the Colonial Botanist.

The collection is similar to that shown last year, but has been added to as good samples have become available. The Mitchell Grasses (*Astrebla pectinata vars.*) are represented by four kinds, and special attention might be drawn to the Curly Mitchell (*Astrebla pectinata, var. curvifolia*), undoubtedly one of the finest of our Western pasture grasses.

Of the genus Andropogon, twelve kinds are shown, among which might be mentioned the Blue Grass (*A. sericeus*)—generally looked upon as one of the best of our indigenous grasses—and the Satintop (*A. erianthoides*).

Three forms are shown of the Kangaroo Grass (*Anthistiria ciliata*)—the common Kangaroo Grass of Southern Queensland; a glaucous (*i.e.*, bluish) form; and the common tropical one, which is of a straggling, entangling habit. *A. frondosa* is a Northern species, much coarser than the Kangaroo Grass. To the same genus belongs the tall Oat Grass of our Downs country (*A. avenacea*).

The extensive genus Panicum is represented by nearly 40 kinds; the genus Chloris (Star and Rhodes Grasses) by 8; Eragrostis or Love Grasses by 11; Eriachne by 7; Setaria by 6; and Sporobolus by 11 sorts.

Two grasses of special mention as growing under trees and relished by stock are—*Elcusine aristata*; and *Microlaena stipoides*, or Meadow Rice Grass. Other grasses shown, that form a sward under trees, are *Oliscanus compositus*, *Panicum pygmacum*, and *P. tenuissimum*.

Grasses forming a useful pasture in salt-water swamps are—*Paspalum distichum, var littorale;* and *Sporobolus virginicus*, and its variety *minor.*

Of special use in wet or damp places are *Leersia hexandra* (Rice Grass); *Oryza sativa* (the normal form of the cultivated rice); *Panicum crus-galli*; *P. proliferum*; *Hæmarthria compressa*; and *Chamæraphis spinescens.* This latter is especially useful, for, as the waterholes dry up, its floating runners rest upon the land, root from the nodes, and cover with nutritious grass spots that would otherwise be bare.

The following kinds exhibited are found growing over our coastal sand dunes:—*Eragrostis Brownii*, var. *interrupta; Spinifex hirsutus* (Rolling Grass); *Stenotaphium subulatum*; and *Zoysia pungens* (the coast Couch).

A new feature will be observed in the exhibit of weeds and suspected poisonous plants, the collection containing a little over 50 species. A very large number of our plants are recorded as poisonous which at times form good herbage; and of very few have we positive knowledge of their poisonous character.

Amongst those shown are the Wall Flower Poison Bush (*Gastrolobium grandiflorum*) and Ironwood (*Erythrophlœum Laboucheri*), two leguminous plants reckoned as amongst the most poisonous we have; *Passiflora spp.* (Wild Passion Vines) (these at times cause the death of stock that may browse upon them); *Lobelia purpurascens* and *Pratia erecta* (two small weeds of the natural order Campanulaceæ, which are poisonous to stock); *Eremophila maculata*, the well-known Fuchsia Bush; the Noogoora Burr (*Xanthium strumarium*); the Caustic Creeper (*Euphorbia Drummondii*); the Scrub Poison Tree (*Excœcacia Dallachyana*); *Pimelea hæmatostachya*, generally looked upon as poisonous to sheep; the Stagger Weed (*Stachys arvensis*), reputed as harmful to working cattle and horses; the Inkweed (*Phytolacca octandra* and *P. decandra*); and others.

WHEAT AND WHEAT-MILLING EXHIBIT.

This occupied the full length of the Court (88 ft. on the Gregory terrace wall); and its features cannot but be impressive of the fact that the oft-repeated statement that Queensland is not a wheat-growing country is entirely without foundation.

In the arrangement of this section, a special display has been made within the central and more prominent architectural feature, a large porch, to demonstrate that prolific yields of good quality grain predominate in the State. In the background is an arch of wheat and scroll work decoratively arranged with wheat-straw and ears in Egyptian character, opening to the view an actual scene on the Hermitage State Farm, where fields of ripening grain form a pleasing setting for a Cornucopia from which large quantities of grain (actually grown on the field in question) are being poured out in such a way as to spread expansively over the edge of the fields in the foreground of the picture, emblematically representing the bountiful yield of grain obtaining in

PLATE 60.—WHEAT EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

the State. Flanking the scene on either side are two "stooks" of sheaves, the latter banded with straw, and a representation of an edge of a field of wheat, the whole arrangement serving to accentuate the subject-matter depicted in the rural scene. On the pilasters supporting the porch are a number of panoramic photographs of typical harvest fields and scenes on the Darling Downs, as well as statistical information setting out individual district and aggregate yields of grain; these are accompanied by a rainfall map on which the "wheat belt" of the State is shown. This latter indicates, at a glance, the immense tract of country within which wheat has been successfully produced. Here the Clermont district is shown as the most northerly locality, the boundary line extending southerly and easterly through Comet across to the Upper Burnett and to Gayndah, thence to Nanango, to Crow's Nest, through Toowoomba, along the Range to Killarney. From this point the boundary extends westerly along the Severn (or McIntyre and Barwon Rivers) frontages to Dirranbandi. Leaving this place, the Maranoa River is traversed northerly, crossing the Main Western Line approximately at Mungallala, and thence by a line to Clermont to junction again with the starting point. There is, however, good reason to anticipate that the boundary already mentioned might be extended in a north-westerly direction from Clermont towards Hughenden and southwards to Aramac, Barcaldine, Blackall, Charleville, to the Southern border.

Another feature of the Cereal Exhibit comprises full-length samples of wheat plants, root, stem, and ears, drawn from six stud wheat plots established last season by the Department at Mitchell, Wallumbilla, Dulacca, Kaimkillenbun, Goomburra, and Inglewood, the samples from each place respectively occupying 100 sq. ft. of wall space. Grain of each variety is also shown in glass, in close proximity to the specimen plants. Interesting comparisons can be made as to the behaviour of individual varieties of wheat raised under varying conditions. In the collection are some 20 odd new crossbred wheats raised at the Roma State Farm, also several named varieties common to other States and to Queensland. The exhibit is interspaced with photographs of stud wheat plots, illustrating the various phases incidental to the testing of different varieties of wheat before their introduction into general cultivation.

Another section of the Cereal Exhibit deals with named varieties in favour throughout different districts of the State. Some 50 odd separate samples will be on view, and, in some instances, comparison can be made between several of the same kinds of wheat drawn from different localities. A description of the field characteristics and full details of the milling tests, with an analysis of each, appear on separate cards.

In reference to what the Department of Agriculture and Stock is aiming at in the milling of wheats, it may be explained that, in order to find the most suitable and profitable varieties to grow in any district, one of the chief points to consider is the suitability of such for milling purposes.

To judge wheat simply on appearance of grain, weight per bushel, &c., is more or less guesswork.

The ultimate aim is always to produce a good bread wheat which, at the same time, has to give, from the farmer's point of view, a heavy yield, which will stand well, and have a good resistance against disease.

The miller again desires a wheat fairly easy to mill, producing a good yield of flour, which, in order to satisfy the baker, must have good strength and colour, and yield on baking a shapely, well-risen, nutritious, and white loaf. The importance of nutrition is, however, often overlooked by the public in their desire for white colour and appearance.

The milling quality of a wheat is, therefore, judged by points on the following determinations carried out in the Laboratory:—

1. Appearance of grain.
2. Weight per bushel in pounds.
3. Ease of milling.
4. Percentage of flour obtained.
5. Colour of flour.
6. Percentage of gluten in flour.
7. Strength of flour expressed in quarts of water per sack of 200 lb. of flour.

In any variety these points will be largely influenced by locality and season, but still characteristic features are generally maintained to a large extent.

In the milling carried out at the Agricultural Laboratory, the process of milling, as practised in flour mills, is followed as closely as it is possible on a small scale, and the results compare favourably with practical milling.

The process is briefly the following:—

The cleaned wheat is washed, dried, and submitted several times to two sets of break rollers—one with coarse and the other with fine-cutting grooves, separating the products, after passing through various sieves in the bolting box, into bran, pollard, semolina, and break flour. The semolina is now passed several times through a set of smooth rollers, gradually getting them set closer and closer, the milling products passing through the sieves until finally the whole are separated into flour, pollard and bran. The products are weighed, and the flour submitted to the various analytical tests, on which points are given.

The Cereal Exhibits, *in toto*, offer unique acquisitive information on the subject, and will serve to demonstrate, in no uncertain way, that more attention should be given to the raising of the all-important grain.

DRY FARMING EXHIBIT.

This section has been designed for the purpose of illustrating experiment work carried out at the Roma State Farm, where Variety, Fertiliser, Rotation, and Cultivation Tests have been carried out for several years.

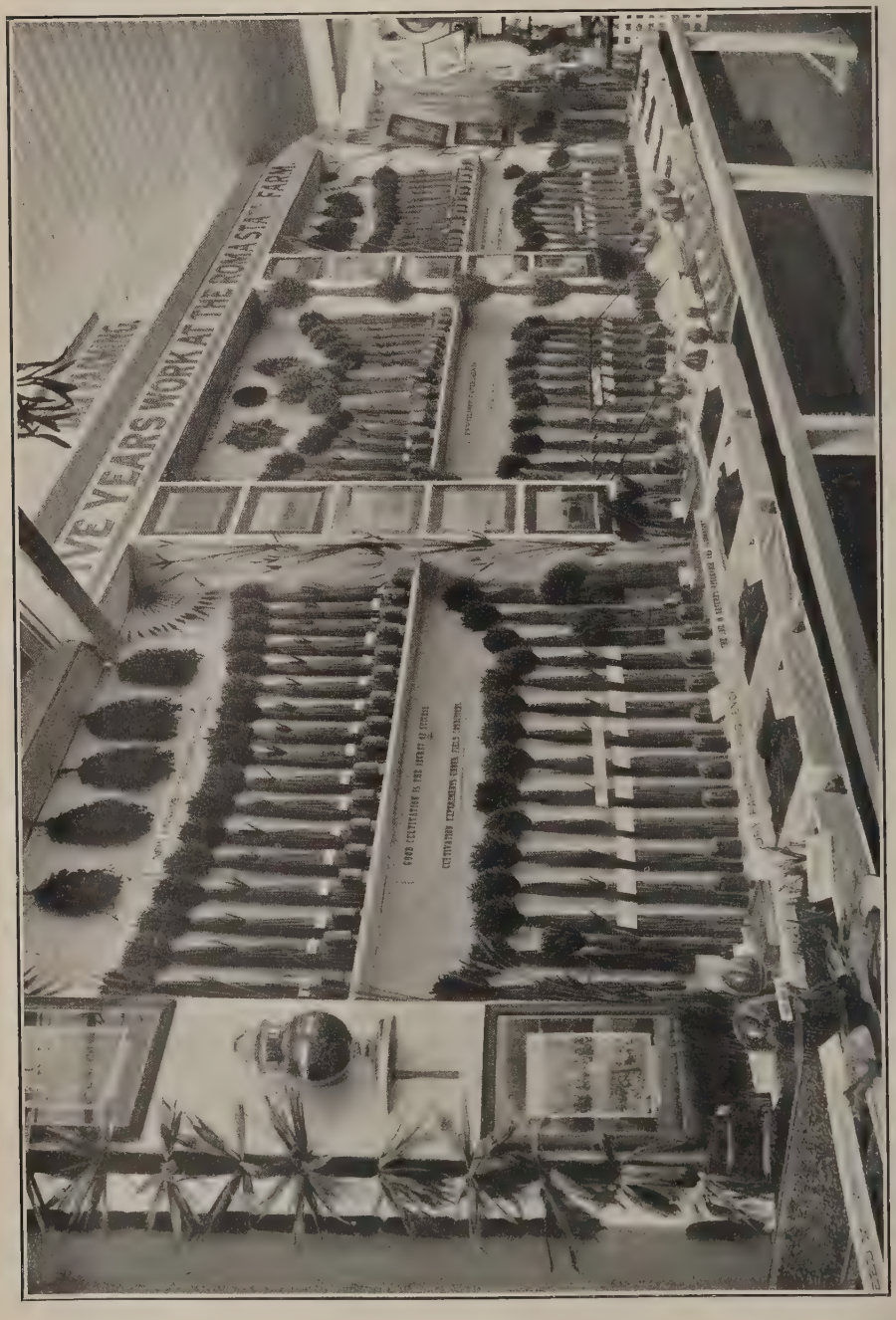


PLATE 61.—DRY FARMING EXHIBIT (ROMA), DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

It is now possible to make deductions from the data available, and in every instance last season's yields are shown in comparison with the averages obtained for the respective periods during which the experiments have been conducted.

The results at the State Farm, when compared with the average returns for the Maranoa district, where low yields obtain, are eloquent of the value of good cultural methods, and no more forcible argument is needed to indicate that, if farmers only give the necessary attention to systematic cultivation, the present output of 84,000 odd bushels of wheat per year could be readily increased to a quarter of a million from the same area of ground.

Comment on this fact only accentuates the loss which individual farmers are suffering.

Dry farming is merely an applied term, and to give effect to its application simply means that common-sense methods, based on scientific principles, must be consistently observed in the preparation and treatment of the soil.

With the object of demonstrating the routine which should be followed in farm practice, a number of sample boxes have been prepared to illustrate (in conjunction with appropriate descriptions) the field operations incidental to giving effect to the system to ensure success.

WHEAT-BREEDING EXHIBIT.

The cross-fertilisation of wheats is one of the principal features at this Farm; and numbers of samples, descriptive of the evolution of a new variety of wheat, are shown on a series of large panel screens in Mendelian character.

COWPEA-BREEDING EXHIBIT.

This section of work is corollary to the wheat-breeding work, and similar screens are on view by way of illustration; in another part of the Court a special exhibit has been prepared, where full-size samples of plants, raised in the process of cross-fertilisation, are shown alongside of their respective parents. Photographs of the plants in question are hung in close proximity, and ready comparisons can be made as to the remarkable differences obtaining from this important branch of work.

MAIZE EXHIBIT.

The premier position attained by this grain in Queensland is sufficient to give colour to the title claimed for it in the trophy on exhibition. Here it is known as "The King of Grains"; and this distinction is emphasised in the arrangement of the central feature of the wall decorations, the Queensland Badge ("A Maltese Cross and Crown" with the word "Queensland" beneath), worked up in appropriate character; the jewels in the Crown being represented by different kinds of grain specially selected for their shape and colour.

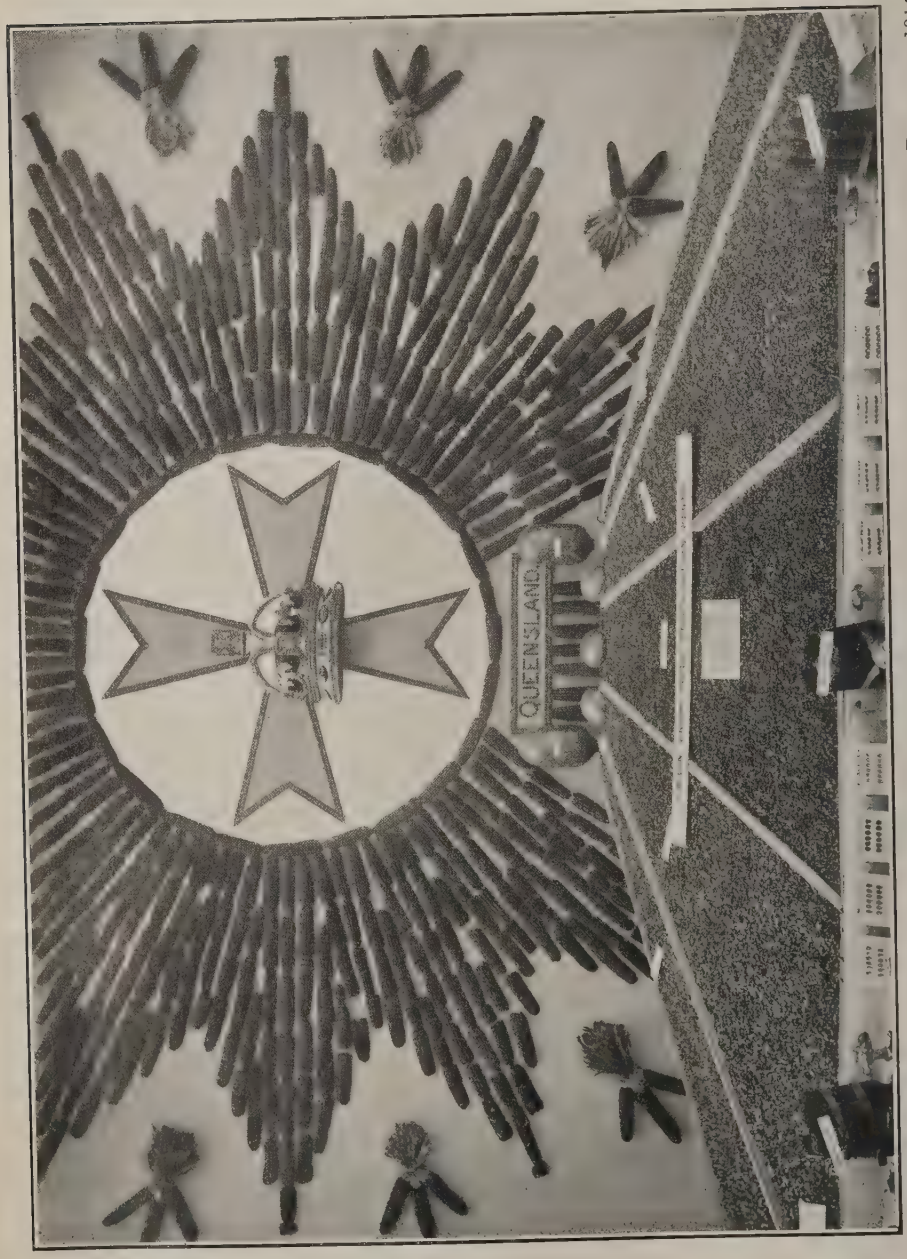


PLATE 62.—MAIZE EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

A large mass of grain surmounting the "Badge," so arranged as to represent the radiations from the Crown, has been fixed in close proximity.

Below the "Cross and Crown" is a large pyramid of grain, divided up into sections, each of which contains a different kind of maize. These latter samples have been drawn from the Departmental seed propagation plots, and are typical of the grain being offered for sale this year to the farmers of Queensland for the purpose of improving the standard of quality and of the productivity of this cereal in the State.

ANIMAL PATHOLOGY AND BACTERIOLOGY.

In the Exhibit from the Stock Experiment Station at Yeerongpilly will be found numerous museum specimens illustrating various manifestations of diseases discovered in Cattle, Sheep, Swine, and other animals; also, a collection of sections of pathological tissues, micro-specimens, and tube cultivations of various micro-organisms associated with animal disorders.

The principal items of interest displayed in the Exhibit are the following:—

TUBERCULOSIS.—Manifestations of the disease in different domesticated and wild animals, showing lesions in the Lungs, Liver, Spleen, Lymphatic Glands, Bones of the Back and Limbs, Omentum, Mesentery, and Intestines.

ACTINOMYCOSIS (Lumpy Jaw).—Growths of this disease affecting the Upper and Lower Jaw, Tongue, Flanks, Scrotum, Lungs, and Liver. *Note.*—This disease sometimes resembles and may be mistaken for Tuberculosis.

PLEURO-PNEUMONIA.—Lungs showing typical marbled appearance, enlarged Lymphatic Glands.

TICK FEVER.—Spleen, Liver, and Kidneys showing characteristic *post-mortem* lesions; Blood Smears stained to show Tick Fever organisms.

TICKS.—This collection illustrates ticks in various stages of development on the skin of cattle, sheep, and horses. Specimen glasses containing ticks in all stages of their life history—fully developed males and females, eggs, larval ticks, and nymphs.

BLACKLEG.—Portion of the affected muscle taken from calves and sheep, showing the dark-coloured tissue with pronounced effusion of serous fluid and gas formation.

SWINE FEVER.—Specimens of the Stomach and Intestines showing the typical ulceration of the inside lining membrane.

MALIGNANT GROWTHS.—Including Cancer, Epithelioma, Carcinoma, Sarcoma, Exostosis, Osteoporosis, &c.

INTERNAL AND EXTERNAL PARASITES.—These include Flukes, Hydatids, Tape Worm, Round Worm, Thread Worm, Worm Nodules in Beef, Larvæ of the Warble Fly, Bots, Acari, Lice, and Ticks.

A COLLECTION OF HAIR BALLS found in the stomach of healthy Cattle, Horses, Sheep, Pigs, Dogs, and Cats.

DISEASES OF POULTRY—Dealing with Chicken Cholera, Fowl Enteritis, and Diphtheria; and Parasitic Diseases, as Scaly-Leg, and the Red Mite which is the cause of Warts.

ECONOMIC AGRICULTURAL BACTERIOLOGY.

Under the heading of what may be termed "Economic Agricultural Bacteriology," there is an interesting and varied display, including the following:—

Vaccines, Viruses, and Serums prepared at the Laboratory at Yeerongpilly, and used successfully in the prevention of the respective animal diseases. These include Blackleg Vaccine, Pleuro-Pneumonia Virus, Blood Serum for Tick Fever, and Auto-vaccine for Sepsis and Contagious Mammitis.

Appliances necessary for use in connection with the preparation and the inoculation of Blackleg Vaccine, Tick Fever Blood, Pleuro-Pneumonia Virus, &c.

Cultures of Lactic Acid Ferment now being used extensively in the ripening of cream and milk in various butter and cheese factories.

Plate and Tube Cultivations of micro-organisms illustrating method of bacteriologically examining water supplies for meatworks, butter and cheese factories, and various articles of fresh, preserved, and canned foods.

Pure Cultivation of Disease-producing and Harmless Organisms Growing in Tubes of Artificial Nutrient Media—

Tubercle Bacilli (Consumption Germs), Human and Bovine.
Malignant Oedema.
Blackleg.
Anthrax.
Coli Communis.
Typhoid Fever.
Canine Distemper.
Pus-producing Organisms.
Chicken Cholera.
Fowl Enteritis.
Locust Fungus.
Lactic Acid.
Butyric Acid.

Also, a number of Colour-producing Bacteria and Mould Fungi.

DAIRYING.

Next to the pastoral and sugar-growing industries must be ranked that of dairying, which continues to make remarkable headway. It has long been recognised that the most successful farmers of the present day

are those who have not got all their eggs in one basket; hence, those who combine dairying, pig-breeding, &c., find themselves, at the year's end, in a better financial position than their neighbours who devote their energies to one class of farming only, the exception being notably the sugar growers.

Noting the phenomenal progress made in the dairying industry of this State during the last few years, it reflects the greatest credit upon those engaged in it, and proves, beyond question, the suitability of the climate, soil, and crops, from South to Far North, for the production of an article for which there is an unlimited demand in London and elsewhere—butter.

FRUIT EXHIBIT.

This has been prepared with the object of drawing attention to the natural advantages possessed by this State for the production of high-class marketable fruit for local consumption and for export. The different kinds shown are drawn from the North and South Coast fruit-growing centres, and represent the chief fruits now in season.

Almost every fruit known can be produced here on account of the wide range in climate common to different parts of the State. The Granite belt in the Stanthorpe district is as justly famed for its temperate fruits (now out of season) as the Southern, Northern, and other districts are for the kinds adapted to sub-tropical and tropical conditions.

Fruit-growing is attracting considerable attention, and much development work is now taking place. To be successful, an intimate acquaintance with and a knowledge of the work are indispensable.

The production of grapes for the year 1913 shows a decided increase over that of the previous season, some four million odd pounds having been gathered in 1913 from an area of 1,450 acres in bearing.

The various influences at work in the banana trade seem to have effected a reduction in the Northern output. Here the growers have curtailed operations, owing principally to the difficulty which has been experienced in the carrying and marketing of the fruit, and to the competition from the Fijian Islands.

In the Southern part of the State, the districts where our chief supplies of bananas are grown are the Blackall Range (which includes Palmwoods, Landsborough, Montville, Maroochy), Buderim Mountains, Samford, North Pine, Redland Bay, Cleveland, and Mount Cotton.

Pineapples are being largely cultivated, and the demand for suitable land is ever on the increase. The year's export of this fruit also shows a considerable advance. The various canning factories absorb large quantities of this fruit, and a large trade in canned pines has sprung into existence. The area under pines in 1913 was 3,014 acres, which produced 744,906 dozen pineapples.

PLATE 63.—1. FRUIT EXHIBIT. 2. COCONUT EXHIBIT.
DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

Apple-growing in the Granite belt is coming into much favour. In the Stanthorpe district 1,522 acres are planted; this area representing 95 per cent. of the total under apples in the State; 2,768 acres represent the area (other than those already mentioned) under miscellaneous fruits in the State.

Custard Apples and Papaws are finding a ready and increasing sale locally and in Sydney, and bring in remunerative returns to orchardists who may be conveniently situated for producing such fruits.

BROOM MILLET.

Although the demand for the particular variety of sorghum called "Broom Millet" cannot be said to be unlimited in this State, yet, in so far as a local demand exists in Brisbane for broom-making, it should be noted that the demand is far greater than the supply. The broom manufacturers have never been able to obtain sufficient for their requirements from the farmers within the State, and hence have been obliged to import largely from America and New South Wales. Why should not all the fibre needed for broom manufacture in Queensland be grown within the State? The natural inference is—either that broom millet is not a paying crop, or that other crops and dairying are more profitable.

The yield from a crop of "Broom" Millet reaches 600 lb. of "broom" and 1,500 lb. of seed per acre. Three months later, in favourable seasons, a second or ratoon crop can be harvested, which may yield an additional 400-500 lb. of fibre.

TOBACCO EXHIBIT.

The samples on exhibition have been drawn from the two chief tobacco-growing districts in the State—Inglewood and Bowen. The former locality is noted for the production of Pipe, and the latter for Cigar leaf. Cigarette leaf, grown at Inglewood, is also shown.

Seven hundred and thirty-one acres were cropped with Tobacco last year, and gave a return of 570,271 lb. of dried leaf, nearly double the amount secured from the 1912 crop.

More care in the production and handling of the leaf is now taken than formerly, and this has effected a general improvement in quality.

INDUSTRIAL WORK.

The exhibit of harness and blacksmithing, from the Queensland Agricultural College, Gatton, serves to illustrate a section of the activities at this Institution, where instructional work in these and other technical subjects is given by competent Instructors.

PLATE 64.—BROOM MILLET EXHIBIT, DEPARTMENTAL COURT (AGRICULTURE AND STOCK), N.A. SHOW, BRISBANE, 1914.

PLATE 65.—DEPARTMENTAL COURT (AGRICULTURE AND STOCK), SHOWING STOCK INSTITUTE, SUSPECTED POISONOUS PLANTS, SADDLERY, AND SUGAR-CANE EXHIBITS, NATIONAL ASSOCIATION SHOW, BRISBANE, 1914.

Pastoral.

THE NASAL FLY.

(OESTRUS OVIS.)

BY W. G. BROWN, Sheep and Wool Expert.

In December, 1913, a warning was published to pastoralists through the "Queensland Agricultural Journal." Since that time numerous grubs of the abovenamed fly have been forwarded to the Department of Agriculture and Stock from nearly every part of the Darling Downs for identification. In all cases they have been identified as the Nasal Fly Grub. I saw them first at Cambooya on the late Mr. T. R. Bodkin's place. Then I heard of them at Warwick, within a few miles of Toowoomba (Mr. Luke, M.L.A., my informant).

In December last year I saw hundreds of these flies at Mr. Chappell's place at Pikedale. Last month a specimen was sent from a station near Mungindi, on the South-western border. Consequently, it may safely be said that the whole Downs is infested with this pest.

In the warning to pastoralists, published last December after my visit to Mr. Chappell's place, I stated that the Sheep Bot Fly resembles the common house fly, but is much larger. It is covered with small round spots. The abdomen bears velvety brown and straw-coloured hairs. The maggots are of a white colour with brown spots on the anterior segment. The eggs are deposited within the nostrils of the sheep. After hatching, the larvæ penetrate deeply into the nasal cavity, and after becoming full grown they fall to the ground, pupate, and finally emerge as fully grown flies. In the earlier stages the maggots may be dislodged with a feather dipped in turps and inserted into the nostrils of the sheep. Tar or whale oil smeared on the nostrils of the sheep will tend to keep the fly away.

The signs that the fly is active are:—Restlessness, stamping, and the holding of their heads against other sheep or in the dust. The time of the attack of the flies in other countries is the autumn, but in this State they seem to fly all the year round. A sheep's head was recently brought into this office which showed grubs in all stages of maturity. It is necessary that, throughout the whole of Queensland, pastoralists should keep their eyes open and stop this pest, if they can, in the early stages.

In June, 1910, a report of the Stock Branch of the Department of Agriculture, Sydney, stated that as long ago as 1904 Mr. Froggatt, the Government Entomologist, pointed out the serious pest which the Blow Fly might become if no steps were taken to limit its prevalence. This equally applies to the Nasal Bot Fly. In this report Mr. Froggatt states:—

> "The Nasal Sheep Fly (*Oestrus ovis*), an introduced pest, known in Europe and other countries, is another serious sheep pest that was reported to be killing sheep, chiefly in the Blue Mountains at Megalong and Lithgow. I visited Megalong and

Gaylong in November and examined a number of animals, but could find no outward signs of the fly, though several sheep that had been killed previously had been found to have maggots in the cavities of the nose. This parasite is probably much more common in flocks than is suspected, but as sheep's heads are so seldom used in the country, they are not observed, and sheep may often die from nasal fly without the cause being known."

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF JULY IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING JULY, 1913 AND 1914, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1914.	July, 1913.
North Coast.	In.		In.	In.
Atherton	0·89	13	0·39	0·54
Cairns	1·14	27	0·35	1·46
Cardwell	1·39	27	0·25	0·07
Cooktown	0·83	27	1·47	1·40
Herberton	0·57	27	0·37	0·45
Ingham	1·50	22	0·90	0·26
Innisfail	4·13	27	1·27	2·41
Mossman	1·54	5	0·81	0·89
Townsville	0·50	30	0·08	Nil
Central Coast.				
Ayr	0·49	27	Nil	Nil
Bowen	0·67	27	Nil	Nil
Charters Towers ...	0·47	27	0·48	Nil
Mackay	1·34	27	Nil	0·24
Proserpine	0·94	11	Nil	0·01
St. Lawrence ...	1·26	27	0·03	0·20
South Coast.				
Crohamhurst ...	2·85	20	2·61	7·12
Biggenden	1·39	14	0·41	0·68
Bundaberg	2·20	27	0·62	1·26
Brisbane	2·32	63	2·03	2·40
Childers	1·76	19	0·99	1·61
Esk	2·11	27	0·88	1·25
Gayndah	1·65	27	0·55	1·58
Gympie	1·97	27	1·36	3·30
Glasshouse M'tains	2·65	6	2·52	4·50
Kilkivan	1·87	27	1·58	0·35
Maryborough ...	2·13	27	0·68	2·26

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	July.	No. of Years' Records.	July, 1914.	July, 1913.
South Coast—continued:	In.		In.	In.
Mount Larcom ...	...	...	0·19	...
Nanango	1·76	27	1·29	0·65
Rockhampton ...	1·58	27	0·08	0·33
Woodford	2·73	27	2·46	3·03
Yandina	2·77	21	2·41	6·14
Darling Downs.				
Dalby	1·84	27	1·24	1·05
Emu Vale	1·50	17	1·12	0·32
Jimbour	1·86	24	1·23	0·68
Miles	1·69	27	1·94	0·61
Stanthorpe ...	2·04	27	1·02	1·27
Toowoomba ...	2·06	27	1·76	1·01
Warwick	1·83	27	0·97	0·82
Maranoa.				
Roma	1·40	25	1·04	0·46
State Farms, &c.				
Gatton College ...	1·54	14	1·00	0·44
Gindie	1·23	13	0·35	Nil
Kamerunga Nurs'y	1·35	23	0·55	0·68
Kairi	...	...	0·58	0·38
Sugar Experiment Station, Mackay	1·36	16	Nil	0·58
Bungeworgorai ...	...	...	1·18	0·35
Warren	...	...	0·13	0·31
Hermitage ...	1·49	7	0·78	0·62

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for July this year and for the same period of 1913, having been compiled from telegraphic reports, are subject to revision.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF JULY, 1914.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Auntie ...	Ayrshire	26 June, 1914	1,015	3·5	41·57	
Lady Margaret	,, ...	19 June ,,	913	3·8	40·68	
Lady Melba	Holstein	6 Mar. ,,	854	3·8	38·02	
Bluebelle ...	Jersey	27 May ,,	779	3·7	33·75	
Miss Edition	,, ...	10 July ,,	675	3·8	30·05	
Bee	,, ...	3 July ,,	674	3·8	30·00	
Lady May ...	Ayrshire	4 May ,,	691	3·5	28·28	
Gretchen ...	Holstein	6 May ,,	791	2·8	25·70	
Miss Bell ...	Jersey	25 Sept., 1913	373	5·6	24·68	
Nina ...	Shorthorn... ...	5 April, 1914	625	3·2	23·33	
Cocoatina ...	Jersey	20 April ,,	424	4·2	20·92	
Miss Melba	Holstein	22 Jan., 1913	502	3·5	20·55	
Lady Athel	Shorthorn... ..	10 July, 1914	559	3·1	20·18	

Ration fed : 20 lb. sorghum ensilage, 2 lb. bran per cow.

TIMES OF SUNRISE AND SUNSET AT BRISBANE—1914.

Date.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·33	5·29	5·47	4·58	6·5	4·46	6·28
2	6·2	5·34	5·28	5·48	4·58	6·6	4·46	6·28
3	6·1	5·34	5·27	5·48	4·57	6·7	4·46	6·29
4	6·0	5·35	5·26	5·49	4·56	6·7	4·46	6·30
5	5·59	5·35	5·25	5·49	4·56	6·8	4·46	6·31
6	5·58	5·36	5·24	5·50	4·55	6·9	4·46	6·31
7	5·57	5·36	5·23	5·50	4·54	6·9	4·46	6·32
8	5·56	5·37	5·21	5·50	4·54	6·10	4·46	6·33
9	5·54	5·37	5·20	5·51	4·53	6·11	4·46	6·33
10	5·53	5·37	5·19	5·52	4·52	6·11	4·47	6·34
11	5·52	5·38	5·18	5·52	4·52	6·12	4·47	6·35
12	5·51	5·38	5·17	5·53	4·51	6·13	4·47	6·36
13	5·50	5·39	5·16	5·53	4·51	6·14	4·47	6·36
14	5·49	5·39	5·15	5·54	4·50	6·14	4·48	6·37
15	5·48	5·40	5·14	5·54	4·50	6·15	4·48	6·37
16	5·46	5·40	5·13	5·55	4·49	6·16	4·48	6·38
17	5·45	5·41	5·12	5·56	4·49	6·17	4·48	6·39
18	5·44	5·42	5·11	5·56	4·49	6·18	4·49	6·39
19	5·43	5·42	5·10	5·57	4·48	6·18	4·49	6·40
20	5·42	5·42	5·9	5·57	4·48	6·19	4·50	6·40
21	5·41	5·42	5·8	5·58	4·47	6·20	4·50	6·41
22	5·40	5·43	5·7	5·58	4·47	6·21	4·51	6·42
23	5·38	5·43	5·6	5·59	4·47	6·22	4·51	6·42
24	5·37	5·44	5·5	6·0	4·47	6·22	4·52	6·43
25	5·36	5·44	5·4	6·0	4·47	6·23	4·52	6·43
26	5·35	5·45	5·4	6·1	4·46	6·24	4·53	6·43
27	5·34	5·45	5·3	6·2	4·46	6·25	4·53	6·44
28	5·33	5·46	5·2	6·2	4·46	6·25	4·54	6·44
29	5·32	5·46	5·1	6·3	4·46	6·26	4·54	6·44
30	5·30	5·47	5·0	6·4	4·46	6·27	4·55	6·45
31	...	...	4·59	6·5	...	...	4·56	6·45

PHASES OF THE MOON.

			H.	M.	
5 Sept.	○	Full Moon	12	1	a.m.
13 ,,	☽	Last Quarter	3	48	,,
20 ,,	●	New Moon	7	33	,,
26 ,,	☾	First Quarter	10	3	p.m.
4 Oct.	○	Full Moon	3	59	p.m.
12 ,,	☽	Last Quarter	7	33	,,
19 ,,	●	New Moon	4	33	,,
26 ,,	☾	First Quarter	8	44	a.m.
3 Nov.	○	Full Moon	9	49	a.m.
11 ,,	☽	Last Quarter	9	37	,,
18 ,,	●	New Moon	2	2	,,
24 ,,	☾	First Quarter	11	39	p.m.
3 Dec.	○	Full Moon	4	21	a.m.
10 ,,	☽	Last Quarter	9	32	p.m.
17 ,,	●	New Moon	12	35	,,
24 ,,	☾	First Quarter	6	25	,,

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, JULY, 1914.

Four thousand seven hundred and sixty-nine eggs were laid during the month. All the birds are now doing good work. The Black Orpingtons are doing especially well, showing what they can do when bred for egg production; this remark refers also to the S.L. Wyandottes. T. Fanning's Black Orpingtons win the monthly prize with 157 eggs. The following are the individual records:—

Competitors.	Breed.	July.	Total.
T. Fanning	White Leghorns	132	476
Kelvin Poultry Farm	Do.	133	442
A. T. Coomber	Do.	111	428
Moritz Bros., S.A.	Do.	142	368
Loloma Poultry Farm, N.S.W.	Do.	115	361
Loloma Poultry Farm, N.S.W.	Rhode Island Reds	126	359
J. R. Wilson	White Leghorns	136	348
J. T. Coates	Black Orpingtons	119	342
R. Burns	Do. (No. 1)	151	330
G. Tomlinson	White Leghorns	137	323
Cowan Bros., N.S.W.	Do.	112	312
G. E. Austin	Do.	101	308
J. Gosley	Do.	111	303
R. Jobling, N.S.W.	Do.	104	301
J. D. Nicholson, N.S.W.	Do.	119	301
R. Burns	S. L. Wyandottes	147	300
Mrs. Bieber	Brown Leghorns	92	297
A. F. Camkin, N.S.W.	White Leghorns	117	297
J. Kilroe	Do. (No. 1)	112	286
E. Le Breton	Do.	137	285
R. Burns	Black Orpingtons (No. 2)	139	285
J. Manson	White Leghorns (No. 1)	110	275
E. V. Bennett, S.A.	Do.	140	271
J. T. Coates	Do.	124	270
J. Franklin	Do.	126	267
A. H. Padman, S.A.	Do.	123	266
Mrs. Munro	Do.	116	263
Marville Poultry Farm, Victoria	Do.	102	259
J. Kilroe	Do. (No. 2)	107	258
F. McCauley	Do.	123	258
Derrylin Poultry Farm	Do.	120	258
T. Fanning	Black Orpingtons	157	249
D. Morton, N.S.W.	White Leghorns	121	248
J. N. Waugh, N.S.W.	Do.	78	240
Mrs. W. D. Bradburn, N.S.W.	Do.	111	237
J. Zahl	Do.	123	233
Range Poultry Farm	Do.	126	227
C. M. Jones	Do.	95	198
F. M. Manson	Do. (No. 2)	73	190
J. Murchie	Brown Leghorns	101	179
Total	...	4,769	11,698

The Orchard.

THE PRODUCTION OF PAPAIN.

Although everyone is familiar with the common papaya (papaw) fruit, and most people are aware also of its digestive properties, many perhaps do not realise the commercial possibilities of the dried juice of the fruit, known as "papain," in the manufacture of medicinal preparations.

Papain is a white, tasteless, and odourless powder used in medicines. Individual samples, however, vary a great deal in appearance and properties. Some are almost inert, but this is probably due to faulty preparation, as the properly prepared article retains its properties well. Careful preparation is, therefore, important. The juice must in every case be collected from unripe fruits. As prolonged moisture is deleterious to the ferment, the juice should be dried as soon as possible, and, as heat will destroy its activity, it should be dried at a low temperature. The best method of preparing papain is to collect the juice of the unripe fruit, mix it with twice its own volume of rectified spirit, let the mixture stand for a few hours, and then filter off the insoluble matter and dry it at the ordinary temperature of the atmosphere.

There are no difficulties, it is stated, requiring great skill in collecting and preparing the juice for market, but care is necessary. Usually only the fruits are tapped. These abound in juice, particularly when the tree is young and during warm weather after rain. In the early morning the flow is most abundant. Very shallow incisions, not over one-eighth of an inch, are made about half an inch apart lengthwise of the nearly mature green fruits. The tapping may be repeated several times at intervals of three or four days. Only non-metallic instruments should be used in tapping or in collecting, for the juice acts upon metals and becomes discoloured. A bone or ivory blade may be used. The flow is free at first, and the liquid is caught in porcelain, glass, or earthenware vessels. Coagulation soon begins, and the mass must be scraped from the surface of the fruit. In most places where the industry is conducted labour is cheap, but it would seem that a more convenient and efficient vessel could be devised which could be quickly put in place to receive the juice, permitting the operator to proceed to the next tree.

The juice must be dried promptly after it is collected or decomposition begins. As the juice flows most freely in the early morning, it is usually collected then and dried wholly or in part during the remainder of the day. Sun-drying is followed to some extent; but artificial means, such as are furnished by a fruit-drier, are preferred. In Montserrat several driers have been made for the purpose and operated by the companies buying the juice from the peasants who gather it. One form of drier is about 3 ft. by 3 ft. and 6 ft. in length. The sides and ends are of brick, with an opening at one end for the flue and at the other end to admit fuel.

The top is open. About 1 ft. below the top a sheet of iron is placed, and upon this an inch or two of sand to modify and distribute the heat arising from the fire beneath. The coagulated juice is spread upon brown linen stretched upon frames which are made to fit the top of the drier. The drying must be effected with low temperatures, as great heat destroys the ferment. A temperature below 100 degrees Fahr. is preferred by some operators. The coagulated material may be placed upon sheets of glass while drying. When dry and flaky, it may be ground in a coffee mill, preferably while warm, and should then be in the form of a white or cream coloured powder, which should be placed in bottles and tightly closed.

In the powdered form or as dried flakes it is exported to America and Europe, where it is further refined and sold as a powder or in tablet or other form, under various trade names as "papoid," "caroid," "papian," "papayotin," &c.—"Indian Trade Journal."

[A simple method of preparing papain will be found in the June issue of the "Queensland Agricultural Journal," 1904. The price varies from 9s. to 15s. per lb. Ed. " Q.A.J."]

PRUNING APPLE TREES.

" As the result of several years' experience," writes an American orchardist, "I venture to say that after the tree is once formed into the correct shape, summer pruning is the most economical for either young or bearing trees. On the young trees it promotes a solid, strong frame at an early age, and on the bearing tree it promotes fruitfulness. During the first three years all the energy of the young tree should be concentrated into building up a strong framework for the future. The most desirable tree for planting is a one-year-old on a two-year-old root, and in planting such a tree the top should be cut back to the point where the future head is to be formed, or at a height of about 18 ft. from the ground.

" As soon as growth starts, all the shoots that appear where they are not wanted must be rubbed off, leaving only three to five well-arranged branches that are to become leaders in the frame of the future tree. The object in rubbing off all the other shoots is to concentrate the growth into only those parts that are most desired. During mid-summer, when the growth is still in full vigour, and the leaders have reached a reasonable length, their tip ends should be pinched out, so as to start outside branches. Several of these will probably appear on each leader, but only two should be allowed to remain, all the others being rubbed off. This work is best done while the shoots are soft, as in that condition the trees do not suffer so much as when the shoots become quite woody and have to be cut.

"Branches should be removed while the trees are dormant, except when pruning is necessary to prevent the spread of troublesome diseases. When doing this pruning always bear in mind that you are trying to solve the problem: How can a solid, strong frame, of the most desirable

form, be most quickly attained? This kind of work takes brains as well as hands, as the work of shaping young trees is to endure for a lifetime. Stop the growth where it is not wanted, and fill out the parts where growth is needed. It is even necessary, in many cases, to put in one or two buds to get branches in the right position. Spread the young limbs where it is necessary, and even tie them into position. Lead the young trees as you lead a child.

"By doing this work every summer, and building up the tree, just as a bricklayer builds a wall by placing brick on top of brick, the growth of the trees can be regulated, and each season the tree will build up two solid stories instead of one. In such management there is no waste growth to look at in the late autumn, and no wood-butchering to do. Both the orchardist and the trees are ahead by following this rule, instead of leaving all the pruning to be done in winter."

TOP WORKING ORANGE TREES.

By CHARLES ROSS, F.R.H.S., Instructor in Fruit Culture.

I have noticed in almost every orange grove of any considerable size in every part of the State, both amongst seedling and grafted trees, that there are individuals that have not come up to expectations as regards cropping, quality of fruit, and type.

Some are consistently poor croppers; others, although being exceedingly productive, the fruit is of indifferent quality, and others again bearing fruit that lacks uniformity of type, or the structural form of the tree is undesirable. Although there are sound reasons for such disappointments, it is not intended here to enumerate the causes leading up to such conditions. I propose giving some instructions how to bring such trees into a profitable condition in the shortest time.

Instead of reconstituting the tree by grafting low down the stumps, there are two methods of top working, over the second or third forks. One is by budding into the old stems, and the other is by grafting. Both methods may be adopted on the same tree.

If the bark is not too thick, the well-known shield method of budding with an inverted T incision may be performed, but in budding old stems I have found it rather difficult to raise the bark without cracking or breaking to allow of the insertion of the bud. To avoid bruising the bark, instead of making a straight incision, make a curved cut in the form of a crescent or half circle, and if the sap flow is active the bark is easily separated from the wood without injury. Angular budwood should be chosen for this method, not rounded, as would be necessary for shield budding. The bud is sliced off, leaving the bud to one side of the shield instead of the centre. The bark is then carefully lifted and the bud inserted, leaving the bud well out to one side of the curved incision. The bud should be tied with waxed cloth, rafia, or worsted.

Grafting is preferable to budding for old stems, except in some special cases. Professor Hume, in his work on Citrus Culture, recom-

mends the cleft graft for top working, and I have also found it the best method in this State.

The stock is cut off at right angles and the cut made perfectly smooth. Then it is split or cleft open by the knife, or grafting iron. Sometimes the cleavage is irregular, and to leave a straight surface for the scion the knife should be driven down in a straight direction. The cleft is held open by the knife or a wooden wedge. The scions should be from 4 to 6 in. in length, having not less than three or four buds. Trim the lower end of the scion in the shape of a wedge, about 1½ in. long, with the outside of the wedge a little thicker than the inner. Slip the wedge portion down the cleft, which should grip the whole of the cut surface. The thicker edges being outside, the cambium layers of both stock and scion are brought more intimately together. Two scions may be inserted if the stock is large, one at each side of the cleft. When the scion is in position the stock is firmly bound with strips of waxed cloth, and the upper surface of the stock, as well as the top of the scion (if cut), should also be waxed.

No further attention is required until the first signs of vegetative activity is evident, when the bandage should be severed. The growing shoot should be supported by a slat tied to the stock.

When a tree is denuded of all its foliage, the branches and stem should be thickly whitewashed to prevent sunburn.

SULPHUR, LIME, AND SALT WASH.

This is an all-round winter wash for all kinds of deciduous fruit trees, and is an exceedingly effectual remedy for white scale, moss, and lichen growths, and the various bark fungi attacking the trunk and main branches of the citrus trees, but is too strong to apply to the foliage unless much diluted. It is both a fungicide and insecticide. It is made as follows:—

Take 40 lb. of unslacked lime, 20 lb. of sulphur, 15 lb. of salt, and 50 gallons of water. To mix, take 10 lb. of lime, 20 lb. of sulphur, and 20 gallons of water; boil for not less than one hour and a-half, or until the sulphur is thoroughly dissolved, in a strong iron (not a thin copper) boiler, when the mixture will be of a brownish colour. Slack 30 lb. of lime in a barrel with hot water, and when thoroughly slacked, but still boiling, add the 15 lb. of salt; when this is dissolved, the whole should be added to the lime and sulphur in the boiler, and the whole boiled for half an hour longer, when water, to make the whole up to 50 gallons, should be added. Strain through a wire sieve, and keep well stirred whilst in use.

As this mixture is very hard on the hands, use gloves when spraying, and have good bamboo extensions fitted to the hose attached to the spray pump. It is also hard on the pump and nozzles, so see that the pump is kept clean, and is never put away without being rinsed out with very hot water. In making this mixture the salt can be omitted if so desired.—"The Agricultural Gazette of Tasmania."

Apiculture.

WARNING TO BEEKEEPERS.

"Bees are dying in thousands in Wiltshire," says the "Daily Telegraph," and the honey harvest promises to be very disappointing. It is interesting to hear the opinions prevailing in the countryside as to the cause of the disease. Many beekeepers declare that the heavy death-rate now is due to the recent spraying of fruit trees with chemical washes, and the trouble is likely to be augmented later when potatoes are sprayed. Hives one day are full of industry, and the next there are dead bees lying about in thousands on the hive floor. A curious point about the disease is that the bee returns to the hive to die. Motor cars with gaseous fumes are suggested as another cause of the bee scourge."

Since this paragraph appeared, we have received a letter from Mr. Arthur N. J. Hill, Toorbul, to the following effect:—

"In your Journal for March and April you give directions for poisoning trees with arsenical solution, but there is one thing I should like to see mentioned in connection with it; that is, a warning in regard to bees, for there is a great danger if the arsenic is applied when the trees are in flower, if the timber treated is anywhere near where there are apiaries. I am sure that a warning is surely needed in that regard when the arsenic process is advised. Would not the solution work as well at any other time than when the trees are in flower? Although no special time is mentioned, there is always the danger of the trees, perhaps, being treated then. The danger of poisoned honey is a very serious one; for, supposing that during a honey flow there were only one or two frames needed to be drawn out a little more to fit the supers for extracting, and a person somewhere within the range of an apiary was to poison an area of timber that was *flowering*, the bees would, during a good flow, fill those few frames from part of the poisoned honey, and, before, perhaps, any effect on the bees were shown, the honey would be extracted and shipped off to a firm, and would be packed directly they received it in retail packages and sold to the public with very serious results. Although no reports are heard of such and no cases have happened here, there is always the danger of it happening if the trees are treated when flowering. It would be very greatly appreciated if a warning were put in the Journal. There is no doubt that the method is a very good one for destroying trees, but, in the interests of all concerned, it should be made known the terrible effect the honey from the poisoned flowers would have. In America the bees are protected from being poisoned through spraying fruit trees when in bloom. Of course, if trees were treated when not in bloom there would be no ill-effect; and if, when the arsenic method were advised, this fact were pointed out, all trouble would be avoided."

Tropical Industries.

THE SEX OF DATE PALM SEEDLINGS.

In the issue of this Journal for March, 1903, we published a short notice, translated from the "Journal d'Agriculture Tropicale," in which it was stated that it is possible to change the sex of the date palm.

The inhabitants of the southern oases in Algeria (says that journal) maintain that it can readily be done. Of 100 date palms, 80 are male trees; hence it may readily be conceived that it is greatly to man's interest that the cultivator's intervention should be crowned with success. The method consists of tearing off all the leaves from the footstalks at two or three years of age, so that the medial nerve is split in two from the centre to the leaf sheaf. The idea of the Arabs is that this tearing process brings on a concentration of the sap movement in the same way as in the case of an annular incision, and results in an accumulation of sap, which is more necessary for the vital functions of the female plant than for those of the male. No objection, says the editor, from a vegetable pathological point of view, can be raised against the above assertion, for the reason that in young plants the organs are not yet different from each other.

In a Bulletin (No. 4, 1914) issued from the Royal Botanic Gardens, Kew, we find the folowing interesting article on this subject:—

Attention has recently been drawn to a belief held by the Arabs that it is possible by artificial means to change the sex of seedling date palms and to convert male into female trees.

Reference to this belief will be found in Popenoe's recently-published book on the Date Palm,* and a note was also printed in the Gardeners' Chronicle† early in the year in connection with an article which appeared in the Tropical Agriculturist‡ of Ceylon on the subject.

The story in which interest has again been aroused is, however, no new one, for it was first brought to the notice of European readers as long ago as the year 1901, when Professor Schweinfurth published an article on "The Cultivation of the Date Palm" in Gartenflora.§ From this original source the account of the supposed change of sex has been somewhat widely, if sporadically propagated.

It reappeared in "Le Jardin" of 20th June, 1902 (p. 177), without any acknowledgment of its source, and thence it has been copied into numerous agricultural journals, &c., becoming considerably modified in the course of years.

It will be seen from information kindly supplied to Kew by Mr. G. St. C. Feilden, Chief Gardener to the City of Cairo, that the Arabs

* Date-Growing in the Old and and New Worlds. Paul B. Popence, p. 123.
† Gard. Chron. Dec., 1913, lv. p. 57.
‡ Trop. Agric. Dec., 1913, xli. p. 482.
§ Gartenflora, 1901, l. pp. 545-6.

believe that the sex of young date palms may be changed under certain conditions; but that these beliefs rest on any adequate basis of fact seems to be highly improbable.

It is alleged, however, that it is possible to tell the sex of seedling date palms before the young plants have flowered, and the information given may be of use to those who contemplate making a date plantation from seed.

Whether there be any truth underlying these Arab beliefs in the possibility of turning male date palms into female or not is really only a matter of minor importance from the economic point of view, since, as Professor Schweinfurth points out in a letter sent to Mr. Feilden, the date palm is propagated almost entirely by the offshoots formed at the base of the palm; for not only is there an uncertainty as to whether a date palm seed will yield a male or a female tree, but there is also the further difficulty that the seedlings only rarely resemble their parents, and it is very unlikely that a good variety will come true from seed.

In order to try and ascertain whether the Arab belief in the change of sex of the date palm might rest on any foundation, letters of inquiry were sent to Professor Trabut at Algiers and to Mr. Feilden. From Mr. Feilden several interesting particulars were obtained in the form of answers to specific questions which he put to three prominent native growers of dates in Egypt.

He also pointed out that the belief in the change of the sex of date palms does not appear to have been an ancient one, since Delile, writing on Egypt in 1824, mentions that the reason why palms were not usually grown from seed was because of the uncertainty of knowing whether the seedlings would be male or female, and that for this reason propagation by offshoots was the recognised method of raising a stock of young palms.

The following questions were put to the native growers:—

1. What percentage of seedling date palms are male?

Answers: A. 66 per cent. male.
B. 33 per cent. male.
C. 33 per cent. male.

2. Is there any way by which the sex of a young date palm can be determined?

Answers: A. The leaflets, especially the lower ones, are stiffer in the males than in the females.

B. The seedlings are covered with a light straw mat; the male seedling pushes its way through or raises the mat. The females bend sideways being weaker. In larger plants same answer as No. 1. Of seedlings planted at same time, the male grows far more quickly than the female.

C. The same answer as A.

3. Is there any way by which the young plants can be made females?

Answers: A. If the seedlings are transplanted at two years old the number of females is at least doubled.

B. Knows of no way.

C. The roots have tubercles on them. If these tubercles are removed the plant becomes female.

C. also says that if seed from dates which have been eaten is sown, the seed presumably being scraped by the teeth, more males result; if the date seed is sown uninjured the females predominate.

4. Have you ever heard of any method of tearing the leaves of the young palms to induce females?

All three growers say they have heard of no such method.

From Professor Trabut we received the following letter* on the subject:—

"The legend of the transformation of the date palm from males to females is an Arab legend, and is given publicity to by M. Le Comte de Follney, landowner at Biskra. I believe that no confirmative experiment has been made. The Arabs operate on seeds of which they do not as yet know the sex. This practice has never been employed continuously. Hence there are never more than 50 per cent. of males produced from the seed. To settle the question, it would be necessary to take 100 seedling palms and split the leaves of all of them to ascertain if, by so doing, they would become females.

"There has never been any idea of operating on the 'offshoots,' but only on the young seedlings which have not yet borne flowering organs. The operation consists in splitting the leaf, following the rachis, which is split down the centre.

"For further information, you might write to M. de Follney, at Biskra, who would be pleased to give you a detailed reply.

"(Signed) L. TRABUT."

Acting on Professor Trabut's advice, a letter was written to the Count de Follney in the following terms* on 14th February last, but unfortunately no reply has as yet been received, and the supposed change of sex of date palms can only be regarded as a supposition believed in by the Arabs:—

"Royal Botanic Gardens, Kew,

"M. le Comte, "14th February, 1914.

"I learn through Professor Trabut, of Algeria, that you are interested in the problem of the transformation of the male date palm into the female tree, and, as this problem is of high scientific interest, I trust that you will kindly give me some information on the subject. Since the year 1901 Professor Schweinfurth has given an account of the method practised by the Arabs to obtain this result, and which consists in splitting the leaves of the young date plants.

"As the details given by him on the subject of this manipulation were furnished to him by you, I would ask if the experiment has been made by you or by others in a systematic manner which would give value to this belief of the Arabs in the transformation of sex in the date palm.

* The letters being in French, we have translated them for the information of our readers.—Ed. "Q.A.J."

"Seeing that apparently the operation is performed on young seedlings, the sex of which it is as yet impossible to recognise, it appears that the only way to prove the truth of the hypothesis would be to plant two seed beds with at least 100 date seeds in each. Then the seedlings in one of these plots should be allowed to develop normally, a note being taken of the proportionate resulting males and females; whilst the leaves of all the others should be split according to the method described, and, if all the plants in this bed proved to belong to the female sex, a sufficient proof would then be afforded of the efficacy of the Arab method.

"Possibly an experiment of this nature has already been made by you, in which case I trust you will have the goodness to give me as many details as possible of the results obtained. If, on the other hand, the Arab belief is still in the realm of legend, I hope that it may be possible for someone interested in the cultivation and propagation of the date palm to carry out some experiment similar to that suggested by me. With apologies for troubling you with this matter,

"(Signed) D. PRAIN, Director."

COTTON IN THE WEST.

In the June issue of the Journal, we gave the views of Mr. E. E. Wood, an American cotton-grower, on Queensland as a cotton-producing country. Mr. Wood, at the time, showed us some fine samples of Upland cotton which he said he had picked at the State school garden at Capella, and also at a farm at Dulacca. Subsequently we were informed by Mr. Just that the cotton came from his son's farm near Miles, as stated in the July issue of the Journal. We are now informed by Mr. A. D. Whitecross, of "Ripera," Dulacca, that the cotton referred to in June was picked by Mr. Wood at Fulham Park, Moraby Creek, South Dulacca, and was grown by Messrs. Simpson Bros. As Mr. Wood picked cotton in several places on the Western line, it is possible he might have got mixed up in the names of growers and localities. We cannot enter into a controversy on this matter, which is, however, of importance as indicating a healthy rivalry amongst the advocates of cotton-growing in the West, which may, we hope, lead to the extension of the cotton industry not only in the West but on the Eastern coast as well.

TWO GOSLINGS FROM ONE EGG.

Two goslings (says the "Live Stock Journal") have just been hatched from a single egg on one of the farms of Messrs. Chivers and Sons at Histon, Cambridgeshire. Such an event is almost unprecedented, the birds from double-yolked eggs usually being deformed, if they hatch out at all, which is rarely the case. These twins are well shaped and healthily developed, and there is every indication that they are going to grow into fine, vigorous birds. The egg that produced the twin birds was hatched out by a hen, who is devoted to her foster-children.

Plant Pathology.

DISEASES OF THE POTATO: REMEDIES AND TREATMENT.

In addition to precautionary measures against the attacks of Injurious Insects and Disease on Seed and Harvested Potatoes dwelt upon by the Government Entomologist and Plant Pathologist (Mr. Henry Tryon) in his paper thereon, published in the Department's pamphlet "Potato Cultivation in Queensland," he further on gives directions for the remedies and treatment for the diseases of the growing plant as follow:—

A.—SOIL TREATMENT.

Cut Worms.

[Dark-coloured, dull, naked caterpillar grubs, upwards of 1 in. in length, the young of *Agrotis subnigra,* and probably of other species of night-flying moths, living in the soil during the day and feeding principally at night.]

Remedies.—Poisoned Baits (*vid.* p. 28).

Note.—It usually happens that these marauders are already in the soil when the land is being prepared for cropping, and may be then both detected and dealt with. In this case the use of the Poisoned Baits, although then most serviceable, especially should the land be well cleaned prior to their employment, may give way to that of the "Travelling Fowl Yard"; poultry being great enemies of cut worms, and soon following all horse implements when seeking them.

Root Gaugers.

[Stout-bodied, oval, glossy-brown beetles, measuring about ¾-inch in length, belonging to the scarabœid genus *Isodon* and species *puncticolle*, and another, that—both in their grub and adult phases—gnaw the tubers, the roots, and the stem bases of the potato plant.] Usually these are present in the soil when the potato is planted. A successful means for coping with them has yet to be devised. The use of Bisulphide of Carbon as a direct insecticide and of "Vaporite Strawson" as a deterrent have been recommended. Fortunately the insects, though very destructive, only exceptionally affect the potato cultivation, or, if generally harmful, only so in few and definite localities.

B.—SEED TREATMENT.

(1) *Brown Rot or Bacteriosis;* (2) *Dry Rot or Fusisporium;* (3) *Black Shank or Rhizoctonia;* (4) *Black Wart;* (5) *Nematode Disease or Root Gall;* (6) *Scab.*

The prevention of these diseases is to be accomplished—(1) by excluding potatoes affected by them when buying, selecting, handling, cutting, or planting the "seed"; (2) by refraining from using, for

successive crops, land that has yielded a stand of potatoes affected by any one of them, or (3) has received a compost composed in part of potatoes or potato plants that have succumbed to their attacks.

As potatoes harbouring these diseases may, when but slightly affected, escape detection during the procedures referred to, and inasmuch as—in the case of some of them—sound potatoes may become infected by contact with diseased ones, the "seed" should be always disinfected as an additional precaution, since such treatment will in great measure eliminate scab disease arising otherwise under this circumstance, and may also lessen, although it cannot be counted on to prevent, the subsequent manifestation of the other maladies mentioned.

Although the occurrence of Potato Blight (*Phytophthora infestans*) may, under some circumstances, be prevented by these actions, additional precautions are necessary that concern the treatment of the growing plant. These, however, *must by no means be regarded as rendering these procedures uncalled for or unnecessary.*

C.—PLANT TREATMENT.

(1) Potato Blight (*Phytophthora infestans*); (2) "Black Spot," "Leaf Spot," or "Early Blight"; (3) Lady Bird Beetles (*Epilachna* 48-*punctata* and *E. guttato-pustulata*); (4) Flea Beetle (*Haltica* (*Arsipoda*) *solani*); (5) Green Caterpillar (*Plusia argentifera*); (6) Split Worm or Leaf Miner (*Gelechia* (*Lita*) *solanella*).

In order to prevent the occurrence of Potato Blight, and to stay its extension in the field; to obviate the attacks of the insects mentioned; and to kill them, and so check their injuries when these attacks are proceeding *it is necessary to spray the growing plants—in fact, the motto of the potato-grower should be "Spray—Spray—Spray"*—three applications at intervals being necessary.

The Spray Fluid applied should be preferably Bordeaux Mixture, to which an Arsenical Compound (Arsenate of Lime, Arsenate of Lead, or Paris Green) has been added, and made according to the directions given later.

In order that this spraying may be effective, the material sprayed must entirely cover the foliage—with a thin film or almost contiguous dots—and remain adherent thereto; and, that this may be so, the spraying must be renewed as often as fresh foliage is produced or the material applied has been removed by rain. The purpose of the application is to prevent the various fungus spores (in myriads though they be) from sprouting; or, should they sprout, to secure that the foliage—at every point—is so poisoned that these sprouts may be killed or prevented from penetrating therein; also, that it will be so generally prevalent on the plant as to reach every leaf-eating insect present thereon or immediately threatening it; rendering, in fact, the foliage either distasteful or deleterious to it. To secure this, the *spraying must be commenced at an early period in the growth of the potato plant*, when, say, it has attained a height of 6 in. or even less; and *it must be repeated at least twice during the growing season* or as often as circumstances, above alluded to, demand.

For the application to be thorough and at the same time made with due economy of material and labour, *it must be applied in a mist-like form* and not necessarily allowed to run down or drip on to the ground.

To secure this, it must be applied with *force* through a Vermorel or Bordeaux atomising nozzle, and by aid of a more or less powerful spray pump. Force again is needed for the spray to be made to reach the under surface of the foliage, although—contrary to what is ordinarily stated—infection commonly takes place through the upper leaf surface.

Where patches alone of potatoes are being grown, an ordinary Bucket Spray Pump will meet all requirements. When, again, areas up to 4 or 5 acres have to be dealt with, a Knap Sack Spray Pump will need be available.

With larger areas, or when operators are available to contract for spraying several farmers' plots of even small dimensions each, other pumps of larger capacity and force may be more economically employed, attached to vehicles drawn through the fields by horse power, and having each several delivery tubes and nozzles, the pumping as well as the control of these being effected by ordinary labour, or the motive power to work the pump being derived from the wheels by special gearing, and the nozzles adjusted to the height and distance apart of the rows of potato plants.

The Bordeaux Mixture (and the same remark applies to the Soda Bordeaux), if properly made, is not injurious to the potato plant in any way. Not only so, it is claimed for it that *it improves the tuber itself*, endowing it with a larger amount of starch than is possessed by unsprayed potatoes, even when those are not visited by *Phytophthora infestans*. Thus it has been asserted of its application that the cost of this is met by the improvement of the crop.

D.—THE "REMEDIES."

(A.) Bordeaux Mixture—with Insecticide.

In the preparation of this, the following materials and utensils are needed:—

1. *Wooden Casks* of good quality, two of 40 gallons each, one of which has been cut across so as to make two strong tubs of 20-gallon capacity, and the other has had its head removed and top hoops replaced in position.
2. Kerosene Tins to serve for boiling water; with or without the addition of wooden pails for pouring a metal corroding fluid.
3. Water, an accessible supply—preferably already contained in a tank.
4. Materials for making an extemporised fireplace and fire in the open.
5. Lime, Quick Lime, or ordinary Kiln Slacked Lime if it be quite fresh (say, 16 lb. for every acre for each spraying); Bluestone, or Copper Sulphate, of good quality (say, 12 lb. for every acre for each spraying).

6. Paris Green, say 1 lb. for every acre for each spraying; or Arsenate of Lead, 2 lb. for each spraying; or Arsenite of Lime.
7. Yellow Prussiate of Potash (Ferrocyanide of Potassium—about 1 oz. dissolved in ½-pint bottleful of water).
8. Some bagging to place over the mouth of a cask for straining purposes, or preferably a strainer made with a square wooden frame, and this fabric or brass gauze to serve the same purpose.
9. A Weighing Appliance (Spring Balance).

In making the combined Fungicide and Insecticide, proceed as follows:—

To make 40 gallons at a time, measure—
Sulphate of Copper (Bluestone), 4 lb.
Fresh Lime, 4 lb. or more.
Water, 40 gallons.

Then, having partly filled one of the tubs with boiling water, suspend the Bluestone tied in a piece of some open fabric from a stick placed across its rim, leaving it till it has dissolved, and then fill up the tub with additional warm or cold water.

In the other tub (or in a wooden pail) place the lime and add hot water in small quantity at first—say, 1 quart or 1½ quart. When the lime begins to crack and crumble and the water to disappear, add another quart or more, being prompt with the supply so that the lime at no time gets too dry. Then add carefully and slowly, more and more water—with stirring—until a perfectly smooth paste is obtained. Then, if not already in the second tub, pour it therein and add water—with stirring—till it be equally full as the other. Now pour these *together* pailfulls at a time with straining—into the 40-gallon open cask, stirring the mixture meanwhile for two or three minutes.

[NOTE.—Any less quantity than 40 gallons of Bordeaux Mixture may be made, of course; the proportions 4-40-4 being observed.]

Four pounds of lime, or a little more than this, is usually sufficient to neutralise the copper sulphate solution. It is, however, well to be prepared with a little additional lime water, since the quality of different limes vary considerably, some containing more or less clay or carbonate, both of which tend to weaken their action in the mixture. Accordingly, when the Bordeaux Mixture has been made as above described, it need be tested in order to ascertain if it is "correct"; for, otherwise, it may damage foliage to which it is applied. The tests available are as follows:—(1) After the mixture has been well stirred, a bright steel knife blade is held in it for at least a minute—"if metallic copper forms on the blade, or, in other words, if the polished surface of the steel assumes the colour of copper-plate, the mixture is unsafe, and more lime water must be added, until this phenomenon is no longer produced"; or (2) if, after stirring well and a drop of the Ferrocyanide of Potassium be added, a red coloration appear where the drop fall. similarly there is indication that more lime is required to be added until the drop is

diffused in the liquid without discoloration. This last test is preferably made in a china cup or saucer.

[NOTE.—The ferrocyanide solution produces a deep-blue precipitate if iron sulphate be present, and this is often an adulterant of Bluestone.]

The Bordeaux Mixture is the better the more freshly prepared it is, and mere standing causes a settlement in it; and in any case it should not be kept in any metal vessel other than a copper or copper-lined one, since it has a corrosive action on metals generally.

However, both the Bluestone Solution and the Lime Water may be kept for a long time unmixed without deterioration. This fact enables concentrated stock solutions to be prepared from which the Bordeaux Mixture may be compounded with great readiness. To make these stock solutions, dissolve 40 lb. of copper sulphate in 40 gallons of water. In another barrel slake 50 lb. of good stone lime, and add enough water for 40 gallons of milk of lime in it. Keep these barrels tightly covered to prevent evaporation. When it is desired to make a barrel of Bordeaux Mixture, stir the stock solutions thoroughly, and dip 4 gallons from each barrel and place in separate tubs, and dilute to 20 gallons and mix as before. Of course any smaller volume of the solutions of 1 lb. per gallon may be employed as stocks. During the later sprayings, when the foliage of the potato is less delicate, the Bordeaux Mixture may be used of greater strength—say of 6-40-4 strength—a formula implying the use of 6 lb. of Bluestone, 40 gallons of water, and 4 lb. of lime.

If good fresh lime cannot be got, use 5 lb. of washing soda instead of 4 lb. of lime; this—as already stated by the writer—makes what is styled Bordeaux or Burgundy Mixture. It—it may be remarked—loses its power of adherence in 24 to 48 hours after it has been made, especially should the temperature be high at the time. It should, therefore, never be used unless freshly prepared.

In cases where the trouble involved in the ordinary preparation of Bordeaux Mixture may forbid its use, the potato-grower may avail himself of the "Bordeaux Paste," that, made according to the directions of Professor S. Pickering for the Duke of Bedford's Woburn Fruit Farm, and that "reproduces—when added to water—a mixture absolutely identical with the commoner fungicide," is now on the market.

The addition of the Insecticide.—Before using the Bordeaux Mixture, it should, however, receive, with thorough stirring, an addition of an Arsenical compound—Arsenate of Lead, 1 lb.; or Paris Green, ½ lb. —for every 40 gallons. In each case it will be convenient to treat these before adding them; the Arsenate of Lead being broken down with water to form a milk-like fluid, and the Paris Green being made into a paste as in the preparation of ordinary paint. This work should be done under cover; and it should be borne in mind that both are virulent poisons; and, when not immediately intended for use, must be kept under lock and key and conspicuously labelled.

The Apparent Absence of Disease not to Excuse the Obligation to Spray.—With regard to the application of Bordeaux Mixture (whether combined with an Insecticide or not) to the potato plant, it is necessary

to point out that it should be made without reference to the absence of the Potato Blight or other diseases. "Notwithstanding [as the writer has already stated] the disease may not appear, or, if so, be little prevalent, during any particular season, still this *spraying is persisted in as a protective measure against its visitation* (as a kind of insurance policy), it not being possible to foretell whether it will put in any appearance or not; and, when procedure is delayed until the earliest symptoms of its presence are revealed, so rapidly may it be propagated that the time for dealing with it will have already gone by in most cases, for the treatment has little or no influence on infection that has already taken place." Its actual presence—for the time being in great measure latent or hidden—is always more general than the earliest symptoms of this indicate, existing, in fact, even when they are as yet unnoticeable.

E.—HAND PICKING.

INSECTS HAND PICKING.—Although the attacks of Lady Birds, and to a less extent those of the Split Worms, may be met by the administration of combined Bordeaux Mixture *cum* Insecticide, and this will in great measure deter Flea Beetles from their destructive onslaught, timely dealing with the Insects by hand-picking is, whilst not a costly operation, a very efficacious one. It is the insects that occur early in the season in twos or threes on the young plants, and so may be easily picked off, that commonly form the hordes that later on may skeletonise the entire foliage or otherwise destroy it later on. So also the first attacks of Split Worm—brown translucent patches on the foliage—may be early discerned, and they and their producers cut out and destroyed. The very rapid rate at which both insects multiply may otherwise account for very serious injury to the growing plants.

F.—ATTENTION TO WEEDS, ETC.

It must not be forgotten that several weeds that belong to the Potato Tribe (Solanaceæ) harbour the insects of the same kinds as those that attack our esteemed vegetable. Attention, therefore, should be given to this fact and to them, with a view to their prompt extermination. The Black Nightshade (*Solanum nigrum*) has especial claims on the farmers' attention in this regard.

G.—TOMATO, ETC., AND POTATO.

What has been stated as regards weeds applies, too, to the Tomato and to a less extent the Egg Plant. Where these are grown near the potato-plot, they should receive similar treatment to it. This has especial reference to the fact that Tomato and Potato alike suffer from "Blight."

H.—POISONED BAIT.—CUT WORMS.

The efficacy of this is dependent on clean cultivation; poisoned baits being not likely to succeed, if the ground supports a crop of weeds or herbage generally; also, on the fact that the cut worms are generally in the soil already when the "seed" is put in and so available to mow down

the young potato plants that result from its growth. It follows from this also that, if after breaking up the land preparatory to planting, it be well worked and kept quite free of weeds for some days prior to the crop being put in, not only will a better crop be secured in the absence of disease, but damage from cut worms will be largely avoided without the use of any "baits" at all.

The materials required for these are:—Any green stuff ordinarily fed to stock or leaves of cabbage, potato, tomato, or succulent non-acrid weed cut into small bits half an inch long; (2) Arsenite of Soda; (3) Molasses or Ration Sugar; and (4) Water.

In combining these to form baits, the Arsenite, Molasses (or Sugar), and Water, in the proportions of 1 lb., 8 lb., and 100 lb. (10 gallons), are mixed in a special receptacle to form a poison fluid, and with this the chopped succulent material is well moistened by aid of a syringe or whisp, being turned over during the process. [NOTE.—It is not desirable to drench it.] This bait thus prepared, and placed in a bag or other receptacle, is broadcasted over the land, before planting, if cut worms have been found to be present. Should, however, their discovery have been made later, it should be sown between the rows, so as not to come in contact with the growing plants.

As the cut worms feed during the hours of darkness, or principally so, this "bait" should be placed in position at about sundown, or shortly before, so that it can be partaken of by the marauders when about, and whilst still succulent; but the application of the sweetened water is not only to maintain the "bait" moist, but to mask the taste of the poison with something to which cut worms generally are especially partial. Of course, this bait should be kept out of the reach of stock and not so distributed as to leave masses that animals can pick up, nor be placed on land that is immediately run and fed over by poultry.

INGREDIENTS—INSECTICIDES AND FUNGICIDES.

The materials to be used as insecticides, germicides, &c., are stocked by the following Brisbane wholesale houses—*i.e.*, Messrs. Taylor and Colledge, Messrs. Elliott Brothers, Messrs. Chater and Company, and W. H. Barnes and Co.; and are obtainable there at the undermentioned prices:—

Sulphate of Copper (Bluestone)—32s. per cwt.
Lime—3d. per lb. (*vid.* firms dealing in building materials).
Paris Green (Blundell and Spence's)—1s. 6d. per lb.
*Arsenate of Lead**—1s. 9d. per lb.
Formalin (40 per cent.)—2s. per pint; 14s. per gallon.
Corrosive Sublimate—4s. 6d. per lb.
Woburn Bordeaux Paste—8d. per lb. (W. H. Barnes and Co.)
Ferrocyanide of Potassium—1s. 6d. per lb. [Quotations, 14th August, 1911.]

* *Vid. Brünnich* (J.C.) and *Smith* (F.), "Commercial Arsenate of Lead": "Queensland Agricultural Journal," Vol. XXVI., 6 pp. (333-336), June, 1911.

SPRAY PUMPS.

Spray Pumps are obtainable from the undermentioned Brisbane firms:—Messrs. Smellie and Company, Edward street; from Messrs. Perry Brothers, Queen street; from B. G. Wilson and Company, Queen street; and from McLennan and Company, Albert street. They should be made of copper, or copper-lined; and the valves—liable when of rubber to perish—should be metal ones (brass). If of rubber, however, several spare valves should be supplied—a remark that applies to other parts when made of this material. The first-named firm stock a knapsack spray pump, named the "Gould," that costs 75s. Messrs. Perry Brothers, and also Messrs. B. G. Wilson, on their part, stock the well-known knapsack spray pump, the "Figaro." This, however, does not possess the metal valves of the former, although it does very satisfactory work. It costs 50s. Messrs. McLennan and Company supply the well-known New Zealand Billen's "Perfect Knapsack Potato Spray Pump." The price of this is 70s. [Quotations, 14th August, 1911.]

"Hand Potato Sprayers" with several delivery tubes, and moved by horse power, are stocked by Messrs. Smellie and Company, Brisbane; Messrs. Edwards and McGinness, Melbourne; and Messrs. Langwill Brothers and Davies, Melbourne. The last-mentioned firm is agent for a "5-row Automatic Potato Sprayer," the "Fleming."

THE EFFECT OF SUGAR-CANE CROPS ON OTHER CROPS.

Some interesting experiments have recently been conducted in Java on the effect of sugar-cane crops on other crops grown on the same soil. Thirty-two plots were laid out in the same series—one series being planted with sugar-cane, and the other with earth-nuts. The next year the whole of the plots were planted with maize. The result was that on the plots which had been planted with sugar-cane the yield of maize was about 81 lb., while on the series which had been planted with ground-nuts the yield was only 54 lb.

The next year the whole was planted with rice, the results being again in favour of the plots which had been planted in the first instance with sugar-cane. It would appear from these experiments that the sugar-cane takes less out of the soil than ground-nuts. The constant growing of cane on the same soil without rotation is in itself evidence of the very small call which the sugar-cane makes upon the soil. In some cane lands there have been uninterrupted crops for scores of years.—"Wealth of India."

Animal Pathology.

TAPEWORMS IN SHEEP AND LAMBS.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

SYMPTOMS.—Eight varieties of tape worms are known to infest the bowels of sheep. Lambs will not fatten when harbouring these worms; they become unthrifty, hidebound, and the wool is hard and poor in quality. The animals appear stiff when moving, and generally hang behind the flock when being driven.

Tapeworms produce emaciation with paleness of the mucous membrane of eyes, nose, mouth, &c. The function of the digestive organs is impaired, the food being chewed irregularly, breath unpleasant, occasional colic, tympany of abdomen, diarrhœa with mucous in which is frequently found segments of the tape worms. The sheep ultimately die from poverty and exhaustion.

PREVENTION.—Prevention consists in draining damp land, stagnant water holes, &c., and by keeping uninfested sheep from known infested pastures. Infested pastures should, where practicable, be ploughed or dressed with salt, lime, or sulphate of iron, allowing about ½ cwt. per acre. Avoid overstocking.

TREATMENT.—For treatment of six-months-old lambs. Fast animals for eight or twelve hours, and give the following:—

Oil of turpentine	1 drachm.
Powdered areca nut	25 grains.
Extract of male fern	15 drops
Linseed oil	1 oz.

Repeat the dose once weekly for three weeks. Repeat the dose according to age of animal.

Where it is not practicable to drench sheep, 25 to 60 grains of areca nut (according to size of animal) should be given to each sheep, on two or three occasions, mixed in some bran or other food.

WHITE SCOUR IN CALVES.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

The following treatment is recommended for White Scour in calves:—

Thorough cleanliness of calf pens, yards, feeding buckets, &c; good clean milk given regularly, and in proper quantities (the quantity should

be reduced somewhat until the bowels are normal). Isolate sick calves. Give two or three times daily, as a drench, in a little water or milk:—

5 to 10 drops pure carbolic acid.
1 drachm glycerine.
I oz. tincture of ginger.

Blood Scour is very fatal, and seldom amenable to treatment. In this case the cows are probably the cause, being frequently affected with contagious abortion, so that investigation should be made in this direction. Even when calves recover from this complaint, they seldom are of any profit to the owner, remaining unthrifty and puny.

Here, again, thorough cleanliness and isolation are essential. Limewash with carbolic acid should be freely used where practicable to walls, fences, &c., around sick animals.

As remarked above, treatment is of little service; but the medicine described for White Scour will answer the purpose, the chief part of it being the antiseptic—viz., carbolic acid

PARALYSIS IN PIGS.

By A. H. CORY, M.R.C.V.S., Government Veterinary Surgeon.

Paralysis in pigs is brought about by several causes—viz., rheumatism, worms in the kidneys and surrounding parts, and by overfeeding young pigs on an exclusive diet of corn and water.

TREATMENT.—If due to rheumatism, see that the pigs are housed at night in a dry place and allowed to sleep on wood flooring instead of on concrete or earth. Give, daily, salicylate of soda 15 to 30 gr., and bicarbonate of potash 1 to 2 drachms, in the food or as a drench.

If due to worms, I would recommend giving in the food or as drench:—One teaspoonful of oil of turpentine; liquid perchloride of iron, 20 drops; and raw linseed oil, 3 or 4 oz. This is sufficient for 50 lb. body weight. It should be given after the animal has been fasting for some hours, and can be repeated several times with an interval of three or four days.

When due to feeding, as mentioned above, stop the corn, and give once daily in a mixed diet or in milk 1 dessertspoonful of the following power for every 100 lb. body weight, after it has been well mixed and powdered:—Sulphur, 2 oz.; sodium bicarbonate, 4 oz.; sodium sulphate, 2 oz.; black antimony, 2 oz.; sulphate of iron, 1 oz.; wood charcoal, 2 oz.

SEED CONTROL.

Austria has an elaborate system of seed control, under which the purchaser may send samples to the institution for examination and testing, and may obtain compensation from the vendor when the seed is not up to a required standard. This compensation is fixed on the basis of the guaranteed practical value as compared with the value of the goods as delivered.

General Notes.

LOUSY SHEEP.

The Chief Inspector of Stock in South Australia, who is doing his utmost to eradicate the lice pest, says that infested Merinos neglected for a few months lose practically all the wool on their sides, as a result of biting and rubbing to relieve the constant irritation caused by the bites of the parasites.

He pertinently points out that the lice are not bred by poverty, as many fallaciously assert. There are males and females, and the life cycle is completed as the result of the latter depositing her fertile eggs in the yolk about the roots of the wool, where they soon hatch out, and increase the sufferings of their unfortunate hosts by sucking blood, and in their turn becoming breeders. The louse, which is a greyish pink, is about the thirtieth of an inch in length, and lies close to the skin. The annual loss to the national wealth through the presence of this destructive parasite has been immense; far greater, in fact, than that caused by the sheep tick—an intimate associate which assists in worrying the host. Lincoln, Shropshire, and Dorset Horn rams have been the means of spreading lice everywhere they have been taken. Ewes become infested at mating time, and are carrying a full supply when their lambs appear. The parasite evinces a particular liking for lambs, and speedily multiplies on them, reducing their condition and the owners' profits. Owners buying rams—particularly the Longwool varieties—will do well to dip them before putting them with the ewes.

The only known remedy for lice is to dip the infested sheep in some of the best-known poisonous powder dips, and, as the eggs are likely to escape destruction in the first dipping, a careful examination should be made in a few weeks, when a second dipping may be advisable. New Zealand authorities assert that sheep need to be dipped twice to thoroughly cleanse them.

NATIVE BIRDS PROTECTION ACTS.

DESTRUCTION OF NATIVE BIRDS.

Notwithstanding the many insect pests which damage or destroy crops of all descriptions, it seems impossible to impress upon the holiday-maker's mind that, were it not for insectivorous birds, these pests would increase to such an extent as to make the raising of field crops, vegetables, and fruit too expensive a business to be profitable. Even a gun tax, to include the mischievous pea-rifle, would be powerless to protect the birds, in consequence of the practical impossibility of enforcing it in country districts. Whilst the legitimate sportsman carefully observes the close season for game birds, the boy with the pea-rifle is troubled with no conscientious scruples on that score. He looks upon every member of the feathered tribe which comes within reach of his weapon as the legitimate object of his nefarious sport. If the attention of these shooters were directed only towards the fruit or leaf

eating birds, no objection could be raised towards their sacrificing thousands of them. Unfortunately, they cannot discriminate between useful and destructive birds; and who is there to teach them? If every State and private school were supplied with well-executed coloured plates of both classes, the teachers would be able to do a great deal towards minimising the evil. We proposed at one time to issue with every Journal one or two such coloured plates, but, unfortunately, these are expensive, and the times have of late been too bad to enable us to carry out the idea. But we shall by no means lose sight of it. Take a few of our insectivorous birds, such as crows, ibis, curlews, owls, night-jars (otherwise moreporks), &c. The crow is generally cunning enough to distinguish between a stick and a gun, and less frequently falls a victim to the gunner. Crows, although they are notorious for destroying chickens, young birds, hares, &c., yet render signal service to the farmer by destroying mice, cutworms, wireworms, &c. It has been calculated in Germany by Herr Rörig that "a field mouse and its progeny will destroy 1,000 plants of grain whilst the latter are developing." We know what tremendous losses the plague of mice inflicted on farmers last year. He also stated that "About 3,000 crows, by destroying mice and other vermin, benefit farmers to the amount of £2,500 per annum. In other words, what is commonly but erroneously known as the carrion crow benefits him to the amount of 11d. per bird per annum over and above the loss it causes him by the destruction of chickens, eggs," &c. Anyone who has watched the flocks of ibis on newly-ploughed land, thrusting their long curved bills deep into the soil, and devouring thousands of worms, grubs, beetles, and larvæ, must be impressed with the great value of these birds; yet how often are they shot in mere wantonness and left to rot on the ground? The number of mice consumed by owls is something incredible.

In 1905 we were indebted to Mr. Hy. Tryon, Government Entomologist and Vegetable Pathologist, for the following information on the food of various birds. He has closely studied their habits and examined their stomachs. This scientific phase of the question we do not attempt to deal with; the object of this article is to draw attention to the indiscriminate shooting of birds, destructive or useful, for no other purpose but sport, or "to keep one's hand in," as swallow and marten shooters express it:—

INSECTIVOROUS AND PARTLY INSECTIVOROUS BIRDS.

Ibis.—The food of the birds comprised by this name consists of frogs, especially in the tadpole state, grasshoppers, grass-eating caterpillars, ground-frequenting caterpillars, soil-frequenting "grubs" generally, young fish, &c.

Carrion Crow.—No bird in Australia bears this name that may be erroneously bestowed on the common crow or raven, or on the white-eyed crow, both of which possess feeding habits distinct from those of the European "carrion crow." The food of the bird of coastal Queensland, the former of the two kinds mentioned, includes grasshoppers, locusts, cicadas, moths, grass-eating caterpillars, soil-frequenting grubs,

and large insects generally. Ticks, rats and mice, eggs of poultry and wild birds, young chickens and ducks (exceptionally); seeds of cereals when broadcasted, plantlets of cereals, maize from the cob (exceptionally), lambs, the eyes of cast ewes and of bogged sheep and cattle; fruit, *e.g.*, pineapples and watermelons; carrion and offal generally.

Pied Crow (*Shrike*).—Insects of various kinds, especially the larger ones—*e.g.*, grasshoppers, locusts, &c.; seeds, berries of wild and cultivated trees, coffee berries, fruit generally—oranges, figs, grapes, strawberries, to most kinds of which it is highly destructive; carrion, including dead birds, &c.

Morepork (Ninix).—The smaller kinds feed on various nocturnal insects, on rodents, on small birds, on young domesticated pigeons. The largest kinds the same, and on birds as large as a laughing jackass—*Decelo sp.* (Brennan).

Night-jar.—On various nocturnal flying insects, and especially on moths.

Laughing Jackass.—On large insects, grasshoppers, locusts, &c., lizards, iguanas (small), snakes, small rodents (rats and mice), chickens, young birds.

Kingfishers (1. *Halcyon*).—Feed on grasshoppers, mantidæ, noctuid caterpillars, lizards (small), tree frogs, spiders, tipulid flies, beetles, white-ants.

Kingfishers (2. *Alcyone*).—Small fish, aquatic insects, flying insects hovering over water.

Butcher Birds (*Cracticus spp.*).—Feed on large insects (grasshoppers, &c.), small lizards and other reptiles, small snakes, caterpillars, soil-frequenting "grubs," small rodents (mice, &c.), nestling birds, small birds both wild and domesticated, very young chickens, hive bees (exceptionally).

Dollar Birds.—Insects (especially beetles) occurring on the wing and in tree-tops; hive bees (exceptionally).

The whole of the State is now under the operation of the Acts, and Queensland is divided into two districts, for which two distinct close seasons are provided. New names have been included in the lists of protected birds. Schedule A contains the names of those totally protected, while in Schedule B will be found those to which partial protection only is afforded. Considering the valuable asset insectivorous birds are to the State, and especially to those people whose occupation is connected with the land, there should be ready assistance given to the Department in the protection of our native birds. It should be noted that any person can prosecute under the Acts.

Reserves can be proclaimed with the consent of the owner or occupier of private lands, and rangers (honorary) appointed when a reserve has been created.

The following particulars—showing the birds which are subject to the operation of the Native Birds Protection Acts, the periods of the year during which the Acts are in operation, and the reserves set apart for the preservation and protection of such birds—are published for general information:—

BIRDS ABSOLUTELY PROTECTED THROUGHOUT QUEENSLAND.

SCHEDULE A.

Common Name.	Technical Designation.
Australian Bee-eaters	Merops
Babblers	Timeliidæ
Bell Birds	Oreoica
Bitterns	Ardeiformes
Black Cockatoos of all species	Calyptorhynchus
Black Swans	Anatidæ
Bower Birds of all species	Ptilonorhynchidæ
Bush Chats of all species	Ephthianurinæ
Cassowaries	Casuariidæ
Caterpillar-eaters	Campophagidæ
Coachwhip Birds	Timeliidæ
Coucals or Swamp Pheasants	Centropodinæ
Cuckoo Shrikes	Campophagidæ
Cuckoos of all species	Cuculidæ
Diamond Birds (Pardalotes)	Dicæidæ
Dollar Birds (Rollers)	Eurystomus
Egrets of all species	Ardeiformes
Fantails	Muscicapidæ
Field Wrens	Timeliidæ
Flower-peckers	Dicæidæ
Fly-catchers (Wagtails)	Muscicapidæ
Fly-eaters	Muscicapidæ
Frogmouths	Podargidæ
Grebes	Podicipediæ
Herons	Ardeiformes
Honey-eaters (except Miners, Wattle Birds, Friar Birds)	Meliphagidæ
Ibises	Ardeiformes
Jabirus	Ardeiformes
Kingfishers (all species)	Alcedinidæ
Kites	Elanus
Land Curlews or Stone Plovers	Œdicnemidæ
Larks of all species	Motacillidæ, Alaudidæ
Laughing Jackasses	Alcedinidæ
Lyre Birds	Menuridæ
Magpies	Gymnorhina
Magpie Larks	Grallina
Martins	Hirundinidæ
Nightjars or Goat-suckers	Caprimulgidæ
Nuthatches or Tree-runners (Woodpeckers)	Sittidæ
Owls	Strigidæ
Parras	Parridæ, Glareolidæ
Parrots (Ground or Swamp)	Pezoporus
Pipits	Motacillidæ, Alaudidæ
Pittas of all species	Pittidæ
Pratincoles	Parridæ, Glareolidæ
Regent Birds	Genus Sericulus (Ptilonorhynchidæ)
Rifle Birds	Paradiseidæ
Robins of all Species	Muscicapidæ
Satin Birds	Genus Ptilonorhynchus (Ptilonorhynchidæ)
Shining Starlings (Calornis)	Eulabetidæ
Shrike Tits	Muscicapidæ
Song Larks	Timeliidæ
Spoonbills	Ardeiformes
Storks	Ardeiformes
Swallows	Hirundinidæ
Swamp Pheasants	Centropodinæ
Swifts	Cypselidæ
Thickheads (Whistlers)	Muscicapidæ
Thrushes of all species	Turdidæ, Prionopidæ
Tit Warblers (Tree Tits)	Sylviidæ
Tree-creepers	Climacteris
Tree-runners	Sittidæ
Warblers	Sylviidæ
White-eyes or Silver-eyes	Zosteropidæ
Wood Swallows	Artamidæ
Wren Warblers	Sylviidæ
Wrens of all species	Sylviidæ

BIRDS PARTIALLY PROTECTED THROUGHOUT QUEENSLAND.

SCHEDULE B.

Common Name.	Technical Designation.
Bronzewing Pigeons	Columbæ
Brown Hawks	Falconidæ
Bustards or Plain Turkeys	Otididæ
Coots	Rallidæ
Cranes	Gruidæ
Crakes	Rallidæ
Curlews	Charadriidæ
Dottrels	Charadriidæ
Doves	Columbæ
Ducks, Wild, of all species	Anatidæ (excepting Black Swans)
Emus	Dromæidæ
Fig Birds	Oriolidæ
Finches (including Plumhead, Banded, Painted, Zebra, and Redheaded Finches, &c.)	Ploceidæ
Geese, Wild	Anatidæ (excepting Black Swans)
Land Rails	Rallidæ
Mallee Fowls	Megapodiidæ
Moor Hens	Rallidæ
Native Companions	Gruidæ
Native Hens	Rallidæ
Orioles	Oriolidæ
Pigeons, all Wild	Columbæ
Plovers	Charadriidæ
Quails	Phasianidæ, Turnicidæ
Rails, Land and Water	Rallidæ
Scrub or Brush Turkeys	Megapodiidæ
Scrub Fowls	Megapodiidæ
Sea Birds, all	
Turkeys, Plain and Scrub or Brush	Otididæ and Megapodiidæ
Waders	Charadriidæ
Water Rails	Rallidæ

Close Seasons.

In District No. 1, from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2, from the first day of November in each year to the thirty-first day of May in the following year, inclusive.

(With the exception of emus on prickly-pear infested lands, where the close season shall be from the first to the seventh day of July in each year.)

For districts, *see* map.

PENALTIES.

If any person shall wilfully kill or destroy any protected native bird, or shall use any instrument whatever, net, or other means for the purpose of killing or destroying any native birds, within the periods hereinbefore mentioned, such person shall, upon conviction, **pay a fine of not less than one pound or more than five pounds.**

If any person shall buy, sell, or knowingly have in his possession, house, or control any native bird at any time within the period hereinbefore mentioned, he shall **pay a penalty not less than one pound or more than five pounds for every bird.**

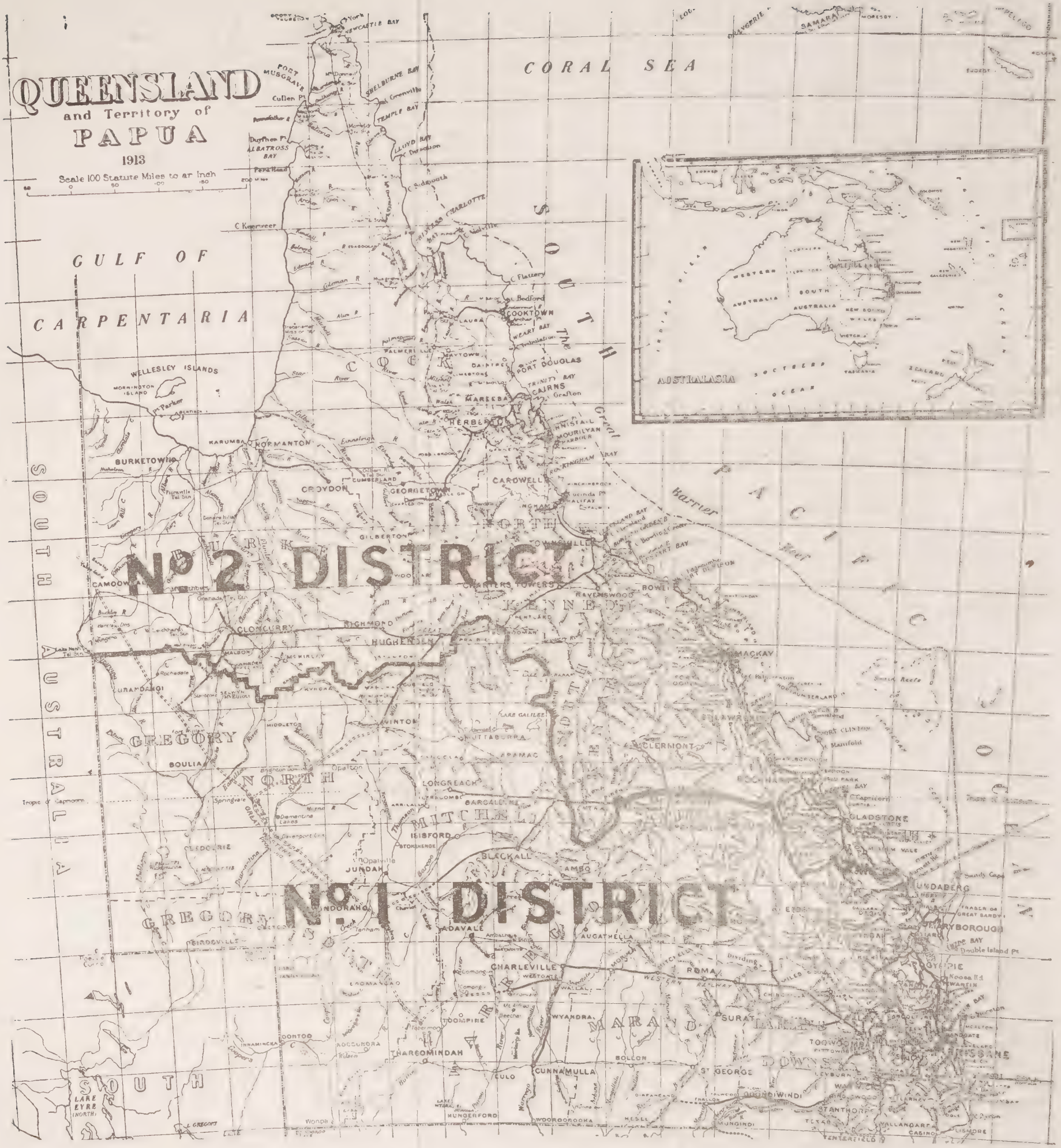
If any person wilfully kills, destroys, or captures any native bird, or uses any instrument, net, or any other means whatever for the purpose of killing, destroying, or capturing any such bird, while it is within or flying over a reserve, he shall be liable upon conviction to pay a **fine of not less than one pound or more than five pounds.**

A moiety of every penalty recovered under the Act shall be paid to the person or persons laying the information.

LIST OF RESERVES WITHIN WHICH THE DESTRUCTION OF NATIVE BIRDS IS PROHIBITED DURING THE WHOLE YEAR.

Situation of Reserve.	For Proclamation and Boundaries *see Government Gazette.*		
	Date.	Part.	Page.
Parish of Enoggera, county of Stanley (Enoggera Reservoir and Catchment Area)	29 Aug., 1885	II.	769
Parish of Gracemere, county of Livingstone	29 Aug., 1885	II.	769
Parishes of Toorbul, Beerwah, and Bribie, county of Canning (Pumice Stone Channels and the shores thereof)	12 Sep., 1885	II.	897
**Parishes of Crow's Nest and Douglas, counties of Cavendish and Aubigny*	10 Oct., 1885	II.	1253
**Parish of Emu Creek, county of Cavendish ... ...*			
**Parish of Douglas, county of Aubigny ... ...*			
Parish of Nerang, county of Ward, Southport	5 June, 1886	I.	1946
Parishes of Moggill and Indooroopilly, county of Stanley (Gold Creek and Moggill Creek Drainage Areas)	13 July, 1889	II.	797
Parish of Boonara, county of Mackenzie (on the leased part of Boonara Run)	14 Sep., 1889	III.	99
Parishes of Enoggera and Indooroopilly, county of Stanley (Mount Coot-tha Reserve)	20 Dec., 1890	III.	1403
Parish of Oxley, county of Stanley (Chelmer Recreation and Water Reserve)	4 Mar., 1893	I.	670
Parish of Hewittville, county of Livingstone (Reserve for Water, Emu Park)	18 July, 1893	II.	583
Parish of Ossa, county of Carlisle, Seaforth	1 Jan., 1898	I.	21
Parishes of Cressbrook, Bowman, and Neara, county of Canning	11 June, 1898	I.	1596
Lake Clarendon	24 Mar., 1900	I.	961
England and Clarendon	25 June, 1900	I.	1650
Fitzroy, Nicholson, Faraday, Calioran	6 July, 1901	II.	564
Gavial and Gracemere (The Duck Pond)	13 July, 1901	II.	633
Horseshoe Lagoon, parish of Selkirk	16 Aug., 1902	II.	421
Cloyna	28 Dec., 1901	III.	990
Parishes of Antill and Jarvisfield	30 July, 1904	II.	249
Parish of Jarvisfield (Church Lagoon)			
Ditto (Red Lily Lagoon)			
Parish of Rockhampton (Murray's and Jardine's Lagoons)	27 Aug., 1904	II.	493
Parish of Charters Towers (Burdekin Weir)	29 Oct., 1904	II.	901
Dunk, Kumboola Island, and Mount Islet, the Family Islands (comprising Thorpe, Richards, Wheeler, Coombe, Bowden, Smith, and Hodson Islands), and Brooks Islands	13 May, 1905	I.	1546
Parish of Yeerongpilly (Russell Wilkins)	16 Dec., 1905	II.	1273
Ditto (Water Reserve)			
Parish of Enoggera (Private lands on Toowong Creek)	11 Aug., 1906	II.	274
Parish of Yaamba (P. F. MacDonald's property) ...	8 Sep., 1906	II.	514
Parish of Noogoon (Mud Island)	8 Dec., 1906	II.	1195
Parish of Broadmere (Lake Murphy	13 Feb., 1909	I.	341
County of Stanley (The Redcliffe Shire)	20 Mar., 1909	I.	738
Parishes of Wyseby and Aubrey (Stud Farm for Breeding Police Horses)	10 July, 1909	II.	70
Parish of Pentland (Pentland Dam and Swamp)	24 July, 1909	II.	220
Parish of Dugandan (A. J. McConnell's property) ...	4 Sep., 1909	II.	587
County of Nares (The Douglas Shire)	16 April, 1910	I.	1002
County of Elphinstone (Abattoir Reserve, Townsville) ...	21 May, 1910	I.	1326
Parish of Taylor, Toowoomba District (Jubilee Park), Redwood Park, Picnic Point, and One-tree Hill)	8 Oct., 1910	II.	1010
Parish of Tingalpa (Shire of Wynnum)	18 Feb., 1911	I.	930
Gladstone Land Agent's District (Capricorn Group of Islands)	5 Aug., 1911	II.	422
Mackay Land Agent's District (Orphanage Swamp and Denman's Water Hole)	23 Sep., 1911	II.	820
Parishes of Rockybar and Eumara (Reeves Lake, &c., on Eumara and Gainsford Holdings)	29 June, 1912	I.	1711
Shire of Widgee	20 Dec., 1913	II.	1741
Parish of Stradbroke (Myora)	11 April, 1914	I.	1036
Shire of Maroochy	2 May, 1914	I.	1173
County of Ward, area on coast from Southport to Pt. Danger	4 July, 1914	II.	78

* Note.—These reserves are for the protection of the following birds only:—Tallegallas or Scrub Turkeys, Bronzewing and all Wild Pigeons, Emus, Regent Birds, Quails.


QUEENSLAND
and Territory of
PAPUA
1913
Scale 100 Statute Miles to an Inch
CORAL SEA
GULF OF CARPENTARIA
SOUTH PACIFIC OCEAN
AUSTRALASIA
No. 2 DISTRICT
No. 1 DISTRICT
NORTH
SOUTH
MITCHELL
GREGORY
KENNEDY
DARLING DOWNS
MARANOA
Great Barrier Reef
COOKTOWN
CAIRNS
PORT DOUGLAS
MAREEBA
HERBERTON
INNISFAIL
TOWNSVILLE
CHARTERS TOWERS
CAROWELLA
GEORGETOWN
CROYDON
BURKETOWN
NORMANTON
WELLESLEY ISLANDS
CLONCURRY
HUGHENDEN
MACKAY
CLERMONT
GLADSTONE
LONGREACH
WINTON
BOULIA
ISISFORD
BLACKALL
JUNDAH
WINDORAH
BIRDSVILLE
ADAVALE
AUGATHELLA
CHARLEVILLE
ROMA
WYANDRA
SURAT
TOOMPINE
THARGOMINDAH
CUNNAMULLA
ST GEORGE
BOLLON
DIRRANDELLA
MUNGINDI
BUNDABERG
MARYBOROUGH
BRISBANE
TOOWOOMBA
STANTHORPE
WARWICK
CASINO
LISMORE
CAMOOWEAL
LAKE EYRE (NORTH)
LAKE EYRE (SOUTH)
Tropic of Capricorn

TRIMMING HIDES.

Winchcombe, Carson, Limited, Sydney, hand us ("Pastoral Review") the following instructions showing how to trim hides according to selling regulations:—

Fore leg to be taken off above the knee (V-shaped inwards). Hind leg at second joint, or hock (V-shaped inwards), no pocket to be left. Tail to be cut off within 2 in. of body. Forehead, ears, lips, udders, and testicle bags to come off. Cheeks to be rounded off, and all useless long pieces on any part of the hide to be cut off.

In regard to curing, make a table on the ground slightly raised in the middle and sloping each side to allow brine to run off. Place the hide—hair side down—on table and cover flesh side with coarse salt—seeing that the edges are not neglected. Stack hide upon hide—always keeping the pelt side up—until a heap is formed. Leave for about a week and then take off, shake salt off, and roll into bundles.

EFFECT OF SMOKE ON STOCK FARMING.

In connection with the investigations carried on at Leeds University on the effect of atmospheric impurities on vegetation, an inquiry was addressed to the farmers of the district with regard to the effect of town smoke on stock farming. The results show that a polluted atmosphere is deleterious to both cattle and horses; young stock do not thrive, and adult stock require more food and greater care than similar animals in a less contaminated atmosphere, the ill effects being due partly to the direct respiration of the smoke-laden air, and partly to the effects of the smoke on the grass. Sheep are rarely seen in these districts, as, in addition to the difficulties of rearing and fattening stock, the depreciation in the market value of the animals as a result of the blackening of the wool by smoke has to be taken into account. The harmful effect of a smoky atmosphere seems to be cumulative from generation to generation.—"The Journal of the Board of Agriculture."

PRESERVATION OF HIDES AND SKINS.

In view of the large exports of hides and skins to meet the requirements of the markets of the United Kingdom and the unsatisfactory condition in which they are reported to arrive at their destination, a recent number of the "Bulletin of the Imperial Institute" gives a number of methods in use for the preservation of hides. Many of these, it says, are unsatisfactory, the hide itself being sometimes damaged by the careless treatment it receives. And the method recommended as the most satisfactory is that known as the "wet-salted method." The skin while being flayed should be prevented from coming in contact with dirt or blood, and should be allowed to fall into a basket or other receptacle, where it is left to cool. It is then washed thoroughly and afterwards drained to remove the excess of water. The skin should then be laid out

flat on a clean floor or a suitable low table, flesh side uppermost, care being taken that every part of the flesh side is exposed. Salt is spread evenly over the whole area of the flesh side; and another hide, similarly treated, placed on top; and the process repeated until a pile about 4 ft. high has been raised. Each skin should be given a quantity of salt equal to 25 per cent. of its weight, and it should be seen that the top skin is well covered over. Where large numbers of hides are being treated, the piles may be built differently; but in whatever way it is done the hides should have plenty of salt. The skins are left in these piles until all the salt has been absorbed, which generally takes about a week; and should they not be "salt-firm"—that is, free from excessive moisture—at the end of this period they are again salted. As soon as the skins are salt-firm they may be baled for transport.

In the case of wool skins, particular care should be taken to prevent moisture coming in contact with the wool during the flaying process. In this case the salting is performed by laying the skins out flat after cooling and rubbing the salt into the flesh side, then folding the skins from belly to belly and baling them for shipment in this state.

The salt used should be fresh, clean, common salt, free from material deleterious to the raw hide or likely to cause trouble in subsequent treatment, while in no case should old or previously used salt be employed. Anhydrous sodium sulphate may be substituted for the common salt and applied in half the quantity—that is, at the rate of 10 to 15 per cent. of the green weight of the skins. In countries where there is a Government royalty or tax on salt, this commodity is denatured before it is put to any industrial use, in order to avoid the payment of this impost. Many materials have from time to time been employed for denaturing salt—*e.g.*, alum, soda, tar products, petroleum, &c.; but all have been a source of difficulty to the tanner, as they form undesirable combinations with the hide substance or cause stains. Recently elaborate experiments undertaken at Turin to discover a suitable denaturant showed that, provided the salt was pure, the addition of 10 per cent. of borax and 1 per cent. of naphthalene was successful, as was also the addition of 1 per cent. of naphthalene, 10 per cent. of sodium sulphate, and 0·017 per cent. of bichromate of potash. The value of the latter mixture for curing could be improved by the addition of 5 per cent. of borax.

Under certain circumstances, when it is desired to economise weight, and therefore cost of transport, it is more convenient to ship the hides in the dry state, and, should this be the case, they should be "dry-salted," if possible. The skins, after flaying, should be well washed, as in the previous method, and should then be hung up in a cool room or shed until partially dry. In this state they are spread on the floor and salted in piles, after which they are rehung until they have acquired a soft but elastic condition, when they are re-salted. This method should only be followed if it is not possible to keep the skins in the wet-salted state, since dry-salted skins are much more difficult to wash and soften for tanning. Probably, also, the crystallisation of the salt has a weakening effect on the fibre of the hide.

In some countries, where salt is dear, the distance of land transit great, and the means of transport primitive, it is only

practicable to dry the hides, without salting them. In this case they should be well washed free from blood and dirt, and in the final washing some aromatic material, such as naphthalene, tobacco juice, or some similar product obtainable locally, should be added to the bath. The skins should then be hung up by the hide flanks or over poles, with the flesh side outwards, in the shade, with a current of air circulating freely round each hide, and on no account should drying be done on the ground or in the sun. This drying ought to take place evenly and gradually, yet rapidly. If it is carried out too slowly, putrefaction sets in, while, if too rapidly, the hide cakes on the outside, and the inside is left moist and putrescible, and there is a strong probability that, in some parts, the fibrous structure will be destroyed and "blistering" will result. The sheds used for drying should be so constructed as to prevent the ingress of flies.

During the washing the skins may be treated with arsenic as a preventive of insect attack. Hides cured by this method, sometimes known as "flint hides," are always more difficult to soften han those preserved by the other methods described, and they command a lower price in the market.

A DONKEY TEAM JOURNEY.

A team of donkeys lately arrived at Longreach after having performed the long journey from Western Australia with a load of 4½ tons. The animals, in spite of hardships on the road, kept in excellent condition.

PLATE 66.—ARRIVAL OF THE DONKEY TEAM AT LONGREACH.

Answers to Correspondents.

POTATO ONIONS.

G.A.F.—

Kindly send further particulars, and give us the name of your locality, as it is not legible in your letter.

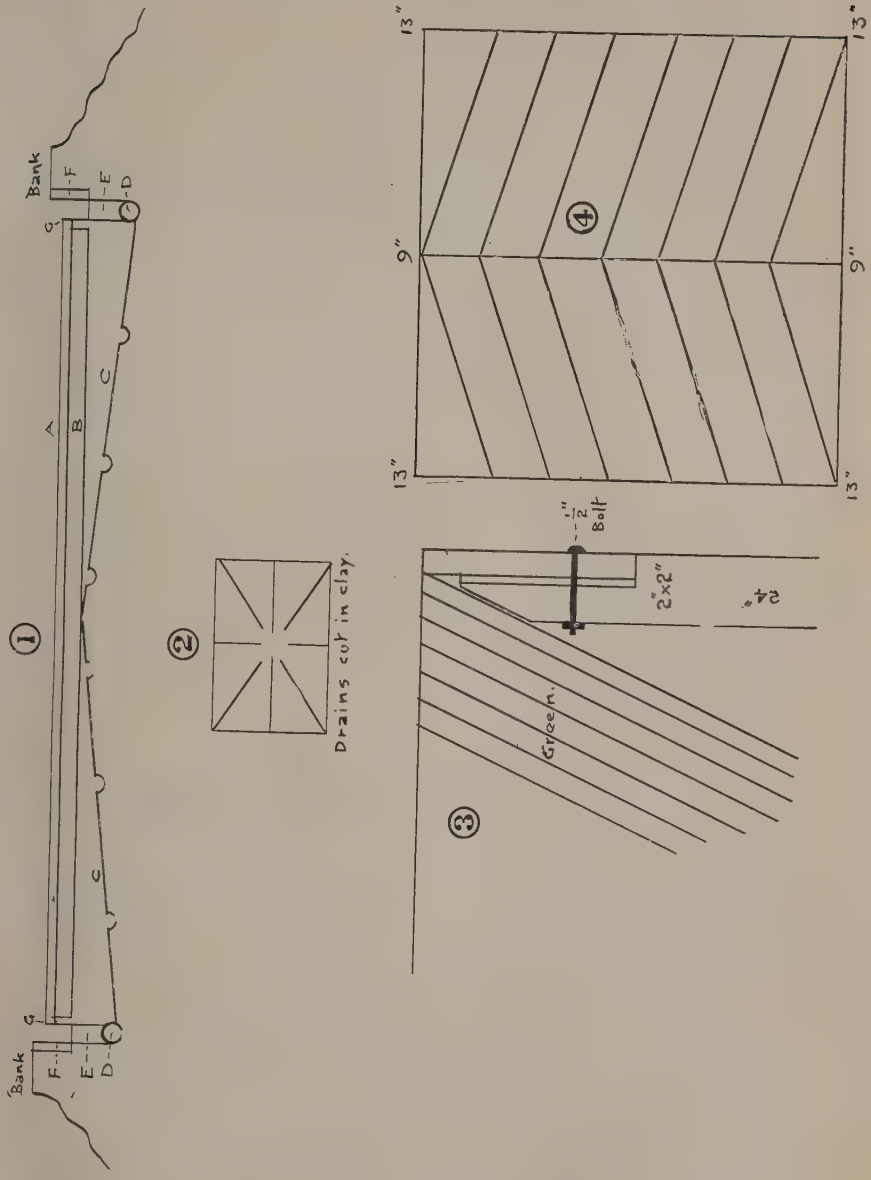
HOW TO LAY DOWN A BOWLING GREEN.

LAWN, Maryborough—

The accompanying plan (cross section) of the Ascot Vale Club Green, Melbourne, kindly supplied to us by Mr. D. S. Warren, hon. secretary of the Sandgate Bowling Club, gives a very clear idea of the nature of the work in laying down a green.

Mr. Warren has also given the following particulars of the work of making a bowling green now in progress at Sandgate:—

1. The site is on the crest of a slight elevation.
2. The dimensions of the green are 123 ft. by 120 ft.
3. The surface soil is poor with a clay subsoil.
4. The excavation varies in depth from 0 to 27 in.
5. A fall of 4 in. is being made from the middle of the green to east and west ditches. (A 6-in. fall in the full length of the green is ample.)
6. To assist drainage, a row of 2-in. agricultural pipes is being placed across the green in drains about 17 ft. apart. Joints are to be covered with metal or clinkers.
7. The foundation of the site is solid, and no metal, &c., is being used; but to assist drainage sea sand running from 0 in. in the middle to 4 in. at east and west ditches is being used.
8. The kerbing is to be 9 in. by 2 in. hardwood. Stay posts 31 in. long are to be placed about 6 ft. apart and sunk from 20 in. to 24 in. in the ground. The posts are to be on the inside of the green, and the kerbing is to be bolted to each. All wood is to be tarred.
9. The best of the soil excavated and an equal quantity of sand (not sea sand) are to be used in filling the area enclosed by kerbing; the last 4 or 5 in. being screened.



CROSS SECTION OF THE ASCOT VALE CLUB GREEN, MELBOURNE.

A—Surface of green, about ½-in. fine black sand.
B—About 5 in. screened ashes and loam mixed (3 of loam, 2 of ashes).
C Coarse ash-bed on top of clay, with cart wheel drains cut in clay, radiating from centre to drains in ditch.
D—Agricultural drain pipes.
E—Ash.
F—Bank faced with Buffalo sods.
G—Plinth, 6 in. by 2 in.

This green is in the form of an inverted saucer in the excavation. It cost £28 per rink for the green itself, as shown above.

10. Every 3 or 4 in. filled in will be rolled with a light roller.

11. To enrich the soil, we have been advised to spread about 10 cwt. of bonemeal over the soil prior to filling in the last 2 in., or to mix it with the soil when screening.

12. We intend chipping ordinary couch grass (not blue or so-called New Zealand couch) found in the streets, and strewing it over the prepared surface and giving it a slight dressing of soil.

13. Ditches will be about 18 in. wide, and 4-in. agricultural pipes will be inserted to carry off drainage.

14. In order to avoid the necessity for deep excavation, we are building up nearly all our banks with the surplus soil excavated.

NOTES.—(*a*) Clinkers could be used where we are using sea sand. (*b*) Cow manure would probably be the means of introducing many weeds into the soil. (*c*) If the natural soil is sufficiently porous, no sand would be necessary, as in our case; but cinders could be mixed with soil, as recommended in the notes on the Ascot Vale Club Green.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR AUGUST, 1914.

Article.		AUGUST. Prices.
Bacon	lb.	9d. to 10½d.
Bran	ton	£6 10s.
Butter	cwt.	112s.
Chaff, Mixed	ton	£6 to £6 10s.
Chaff, Oaten (Victorian)	"	£6
Chaff, Lucerne	"	£6 5s. to £6 15s.
Chaff, Wheaten	"	£4 10s.
Cheese	lb.	7½d.
Flour	ton	£9
Hams	lb.	1s. 1d. to 1s. 2d.
Hay, Oaten (Victorian)	ton	£6 5s. to £6 10s.
Hay, Lucerne (Prime)	"	£4 10s. to £5 10s.
Honey	lb.	2½d. to 2¾d.
Maize	bush.	3s. 5d. to 3s. 6d.
Oats	"	3s. 7d. to 3s. 11d.
Onions	ton	£9 10s. to £10
Peanuts	lb.	3d. to 3¼d.
Pollard	ton	£6 10s.
Potatoes	"	£8 10s. to £9
Potatoes (Sweet)	cwt.	2s. 9d. to 3s.
Pumpkins	ton	£2 5s.
Wheat, Milling	bush.	3s. 11d. to 4s. 1d.
Eggs	doz.	7½d. to 9d.
Fowls	pair	3s. 3d. to 5s. 3d.
Geese	"	5s. 9d.
Ducks, English	"	2s. 9d. to 3s. 7d.
Ducks, Muscovy	"	4s. to 5s. 6d.
Turkeys (Hens)	"	5s. 6d. to 7s. 6d.
Turkeys (Gobblers)	"	10s. to 14s.

SOUTHERN FRUIT MARKETS.

Article.	AUGUST. Prices.
Bananas (Queensland), per case	12s.
Bananas (Fiji), per case	17s. to 18s.
Mandarins (Queensland), per case	7s. to 9s.
Oranges (Navel), per case	13s.
Oranges (other), per case	7s. to 9s.
Passion Fruit, per half-case	5s. to 7s.
Pineapples (Queensland), (Queens), per case	7s.
Pineapples (Ripleys), per case	7s. 6d.
Pineapples (commons), per case	6s. to 7s.
Tomatoes, per quarter-case	3s. 6d. to 4s. 6d.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	AUGUST Prices.
Apples, Eating (Local), per case	8s. to 10s.
Apples (Cooking), per case	7s. 6d. to 9s.
Bananas (Cavendish), per dozen	2d. to 3d.
Bananas (Sugar), per dozen	1d. to 2¼d.
Cocoanuts, per sack	12s. to 14s.
Cumquats, per quarter-case	1s. 6d. to 2s. 3d.
Custard Apples, per quarter-case	4s. to 5s. 2d.
Lemons (Local), per case	5s. to 7s.
Lemons (Italian), 160 fruits, per case	3s. to 4s.
Mandarins, per case	6s. to 10s.
Oranges, per case	3s. 6d. to 6s.
Papaw Apples, per quarter-case	1s. to 2s.
Passion Fruit, per quarter-case	6s. to 7s.
Peanuts, per pound	3d. to 3¼d.
Pineapples (Ripley), per dozen	1s. to 2s.
Pineapples (Rough), per dozen	4d. to 9d.
Pineapples (Smooth), per dozen	1s. 6d. to 2s.
Strawberries, per tray	1s. to 2s.
Tomatoes, per quarter-case	3s. to 4s. 6d.

TOP PRICES, ENOGGERA YARDS, JULY, 1914.

Animal.	JULY. Prices.
Bullocks	£11 12s. 6d. to £14 5s.
Cows	£8 7s. 6d. to £10 10s.
Merino Wethers	34s. 3d.
Crossbred Wethers	29s. 9d.
Merino Ewes	26s.
Crossbred Ewes	27s. 6d.
Lambs	22s. 6d.
Pigs (Baconers)	74s.
Pigs (Porkers)	48s.

Farm and Garden Notes for October.

Field.—With the advent of warmer weather and the consequent increase in the soil temperature, weeds will make great headway if not checked; therefore our advice for last month holds good with even greater force for the coming month. Earth up any crops which may require it, and keep the soil loose among them. Sow maize, sorghum, setaria, imphee, prairie grass, panicum, pumpkins, melons, cucumbers, marrows. Plant sweet potatoes, yams, peanuts, arrowroot, turmeric, chicory, and ginger. Coffee plants may be planted out. There are voluminous articles in previous journals giving full instructions how to manage coffee plants, from preparing the ground to harvesting the crop, to which our readers are referred. Cotton may still be sown.

Kitchen Garden.—Our notes for this month will not vary much from those for September. Sowings may be made of all kinds of vegetables. We would not, however, advise the sowing of cauliflowers, as the hot season fast approaching will have a bad effect on their flowering. French beans, including butter beans, may be sown in all parts of the State. Lima and Madagascar beans should also be sown. Sow the dwarf Lima beans in rows 3 ft. apart with 18 in. between the plants. The kitchen garden should be deeply dug, and the soil reduced to a fine tilth. Give the plants plenty of room, both in sowing and transplanting, otherwise the plants will be drawn and worthless. Thin out melon and cucumber plants. Give plenty of water and mulch tomato plants planted out last month. Asparagus beds will require plentiful watering and a good top-dressing of short manure. See our instructions in "Market Gardening," obtainable on application to the Under Secretary, Department of Agriculture and Stock. Rosella seeds may be sown this month. No farm should be without rosellas. They are easily grown, they bear heavily, they make an excellent preserve, and are infinitely preferable to the mulberry for puddings. The bark supplies a splendid tough fibre for tying up plants. The fruit also makes a delicious wine.

Flower Garden.—The flower garden will now be showing the result of the care bestowed upon it during the past two months. The principal work to be done this month is the raking and stirring of the beds, staking, shading, and watering. Annuals may be sown as directed for last month. Plant chrysanthemums, gladiolus and other bulbs, such as tube-rose, crinum, ismene, amaryllis, pancratium, hermocallis, hippeastrum, dahlia, &c. Water seedlings well after planting, and shade for a few days. Roses should now be in full bloom. Keep free from aphis, and cut off all spent flowers. Get the lawn-mower out and keep the grass down. Hoe the borders well, and trim the grass edges.

Orchard Notes for October.

THE SOUTHERN COAST DISTRICTS.

As October is often a dry month throughout the greater part of the State, one of the most important duties of the fruit-grower is to keep his orchard or vineyard in a thorough state of cultivation, thus retaining the moisture in the soil that is essential to the setting and development of the fruit crop. As long as the land is level one cannot over-cultivate, as there is no danger of the soil washing, but when the orchard is on a hillside heavy thunderstorms, which may occur during the month, are very apt to cause heavy washaways of soil if the land is kept in the high state of tilth necessary to retain moisture. In this case the cultivation should always be across and not up and down the face of the hill, and where the soil is of such a nature that it will wash badly thin blocks, consisting of a row or two of a growing crop or of light timber, brushwood, or even a body of weeds or heavy mulching, should be provided, such blocks to follow the contour of the orchard. If dry, and water for irrigation is available, citrus trees will be the better for a thorough watering during the month. Give the trees a good soaking, and follow the irrigation by systematic cultivation, as this is much better than constant surface watering, as practised by the Chinese. Examine the orchard and vineyard carefully for pests of all kinds. When young trees are showing signs of scale insects, cyanide same; when leaf-eating insects of any kind are present, spray the plants that are being attacked with arsenate of lead. Look out carefully for black spot and oidium in grape vines, using Bordeaux mixture for the former and sulphur for the latter. When using sulphur, see that you get a fine sample—viz., one in which the particles of sulphur are in a very fine state, as the finer the sulphur the better the results. Do not apply the sulphur in the early morning, but during the heat of the day, as it is the sulphur fumes, not the sulphur, which do the good. A knapsack sulphurer is the best machine for applying sulphur to grape vines, trees, or plants.

Examine any late citrus fruits or early summer fruits for fruit-fly, and take every precaution to keep this great pest in check now, as, if fought systematically now, it will not do anything like the same amount of damage later on as if neglected and allowed to increase unchecked. October is a good month for planting pineapples and bananas. Be sure and have the land properly prepared prior to planting, especially in the case of pineapples, as the deeper the land is worked and the better the state of tilth to which the surface soil is reduced the better the results, as I am satisfied that few crops will pay better for the extra work involved than pines.

THE TROPICAL COAST DISTRICTS.

As the fruit-fly usually becomes more numerous at this time of year, especial care must be taken to examine the fruit thoroughly prior to shipment, and to cull out all fruit that has been attacked by the fly. Banana and pineapple plants may be set out, and the orchards should be kept well tilled, so as to have the land clean and in good order before the heavy summer growth takes place.

All the spring crops of citrus fruits should be now marketed, and the trees, where necessary, should be pruned and sprayed, and the land be well ploughed. The ploughing should be followed by harrowing and cultivating, so as to get the surface of the land in good order. Granadillas and papaws should be shipped to the Southern markets, as, if care is taken in packing and they are sent in the cool chamber, they will carry in good order. These fruits should not be gathered in an immature condition, as, if so, they will never ripen up properly. They should be fully developed but not soft, and if gathered in this condition, carefully handled, and packed and shipped in cool storage, they will reach the Southern markets in good condition, and, once they become commonly known, will meet with a ready sale.

SOUTHERN AND CENTRAL TABLELANDS.

In the Stanthorpe district the spraying of apple, pear, and quince trees for codling moth will have to be carefully carried out, the best spray being arsenate of lead, of which there are several reliable brands on the market.

When fungus diseases, such as powdery mildew, &c., are also present, Bordeaux mixture should be combined with the arsenical spray.

The vineyard will require considerable attention, as the vines must be carefully disbudded, and any signs of oidium or black spot should be checked at once. Look out for late spring frosts, and, if possible, try the effect of smudge fires producing dense smoke for preventing any damage.

Keep the orchards and vineyards well cultivated, as it is of the utmost importance to keep the moisture in the soil at this time of the year if a good fruit crop is to be secured.

In the warmer districts cultivation is all-important, and when irrigation is available it should be used for both fruit trees and vines, a thorough soaking followed by systematic cultivation being given.

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